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EDITORIALS

A PERSONAL WORD

With this, the first number of the fifth volume of the American Journal of Public Hygiene, a few words in regard to its past and a few announcements for the future may not be out of place.

Five years ago, foreseeing the need for a national publication devoted exclusively to the public hygienist and sanitarian, this Journal was launched. As previous to that date the Journal had been but the mouthpiece of a State public health organization, it was some little time before the country at large could look upon it except in that light. As with most other ventures of the kind the fight has been an uphill one against heavy odds, and the time and energy of the Editors have been put into the work without thought of reward except that which may have come from the result obtained. Credit is largely due to the present Associate Editor for his foresight in perceiving the field which the Journal might some time fill, and to the Massachusetts Association of Boards of Health for its loyal backing.

Last year the JOURNAL served as the official organ of the Laboratory Section of the American Public Health Association. This year it retains that honor and becomes besides the organ of the Association itself, as well as of the two new Sections of Municipal Health Officers and of Vital Statistics.

During the past year there have been times when the cost of publication of an issue were greater than the proportional part of the subscription price. During the present year the number of pages per issue will probably average two hunderd, or one hundred pages more per issue than last year. It is, therefore, no longer possible to accept subscriptions at the old rate and pay expenses. The new rate will be $1.50 per year or 40 cents per number in the United States and Mexico, and $1.75 per year or 45 cents per number for Canadian and foreign subscriptions. For the present, as an acknowledgment of their loyalty, old subscribers will be allowed to renew at the old rate.

An innovation with this number will be found on the first rear advertising page, where for subscribers and members of the two Associations which we represent, announcements will be made free of charge of professional openings and positions wanted in hygiene work.

With the idea of making the JOURNAL as serviceable and readable as possible the Editors welcome suggestions and criticism. We ask our readers to bear in mind, however, that our activities are chiefly governed by our limited resources, and that a suggestion requiring the outlay of dollars and cents to be practical should be accompanied by one leading to a larger subscription list. A list of names of people interested in some way in sanitation or hygiene may indirectly lead to a larger and more influential organ.

B. R. RICKARDS.

SOME ASPECTS OF THE ALCOHOL QUESTION

THE so-called temperance question is, as a rule, most intemperately discussed. The advocates of total abstinence seem to feel that their position requires that they deny all utility to alcohol as an adjunct to the diet. Those who indorse its regular use are often equally extreme in their claims. Deliberately or unconsciously they underestimate drawbacks and dangers, while they make much of dubious advantages. Insincerity of argument is not confined to either side.

The highest moral consideration which leads to total abstinence is that of regard for the example which one sets to others. With this ethical matter the writer has no occasion to deal. It is his object merely to weigh, with the least possible prejudice, what may be said of alcohol on physiological and dietetic grounds.

We live in a country in which the agitation against alcohol has been strong and ably led. We find it used mainly by the wealthy and the poor, while quite generally excluded by those in moderate circumstances. In such an environment we are likely to forget how generally this fermentation product is consumed the world over. It is something of a shock to us to find how nearly universal has been its praise in the older literature and how few of the great men of history have avoided its use. The Bible includes passages which celebrate, as well as others which reprobate, the drinking of wine. Yet from most ancient times the disastrous effects of intemperance have been recorded, and now and again there have been efforts to stamp out the use of alcohol. The greatest of these movements has been that instituted by Mohammed. The sentiment which has become so strong

in our own time and land dates back barely one hundred years to the days of Benjamin Rush and Lyman Beecher.

The tendency to take a partial and partisan view of the alcohol question arises from the fact that this chemical compound has many effects on the human system, and a writer usually fixes his attention on one class only. With most articles of diet the comparison of merits and disadvantages is easy, with alcohol this is difficult. We propose to separate under five heads some of its characteristics, discussing it successively as a relish, a food, a drug, a mental alterative and a poison.

The value of a relish may be much more than æsthetic. Palatability of food is not important merely as a matter of present pleasure, but is often the guarantee of successful digestion. Physiologists recognize the existence of a class of bodies which they call food accessories, forming a very small fraction of the diet as measured by weight, but giving it distinctive character through the flavors and odors which they confer. Hunger, or at least lively appetite, is no doubt "the best sauce," but in default of appetite material substitutes are extremely useful. Alcohol cannot be denied a place among such promoters of digestion. It is known to quicken the flow of gastric juice, while it does not hinder the action of this secretion unless it is taken in great concentration. The finer beverages reinforce the direct effect of the alcohol through their choice and delicate fragrance, appealing so pleasantly to the consciousness of the leisurely diner. On the other hand, it may be said that it is sound hygiene to teach the maintenance of such a degree of health that the appetite shall not require whetting and, moreover, that well-cooked and varied food ought to be sufficiently attractive without the preliminary cocktail or accompanying wine. It is clear, too, that the admission of alcohol as a relish does not justify its use apart from meals.

There has been much loose debate concerning the food value of alcohol. Total abstainers, not content to rest their

case on the obvious ruin wrought by drink, have been vehement in denying it all possible service in nutrition. They have had a certain amount of scientific support. But there seems to be ample reason to regard alcohol as a food, providing we adopt a reasonable definition of the latter term. It cannot make any part of the body, so far as we know. Neither living tissue, nor lifeless fat, nor the starch-like reserve store called glycogen can be produced from it. It is not a building material, and it cannot be retained as a fuel against a future time of need. But then, only a small part of any diet enters into relations with the body for more than a few hours. Most of our food serves us by the release of its chemical energy in undergoing a prompt destruction. As alcohol in small quantities is destroyed like the rest and as its energy is likewise set free, it becomes a source of heat as truly as though it were burned in a lamp. We must grant it a place among possible foods, though in so doing we do not recommend its use any more than we advocate the consumption of any other article which is injurious and expensive. A man may reduce his potato or his rice by the substitution of alcohol, but the possibility does not make the change advisable.

Dr. S. J. Meltzer has said that "alcohol in health is mostly a curse and in disease mostly a blessing." Its marked value in sickness lies in the fact that it is at once a food and an accessory, that it requires no digestion and that it is swiftly absorbed. It can reach the circulation and serve the body at times when the digestive glands refuse to secrete. This is not equally true of any other food, unless it be grape-sugar, which, of course, cannot be taken freely by the sick. Whiskey has probably saved many lives in cases where its employment as a food has tided patients over critical periods, sparing their limited resources in fat and tissue on which, except for the substitution, the tax of heat production must have been levied. But the lives saved by alcohol in sickness must be few indeed compared with the number sacrificed through

its abuse. If reformers are unfair in their claim that alcohol can never be a food, their opponents are equally so in their exaggerated statements concerning its nutritive powers. Its use is often defended on the ground that it is a food, when the real motive for its employment is to obtain its cerebral effects.

Viewed as a drug, alcohol has certain positive properties. In faintness it often proves an effective restorative. Its virtue in this instance springs from its prompt influence upon the nerve centers governing the heart and the blood vessels. The circulation is quickened. Its most marked property is seen in the increased blood flow produced in the skin. This effect accounts for the sensation of warmth and tingling which follows the taking of two or three glasses of wine. And it is in this connection that we ought to call attention to a common misunderstanding. The feeling of warmth is due solely to the state of the surface of the body; it gives no clue to internal conditions. Now when the skin is filled with swiftly flowing blood one is certain to feel warm, but it is at such times that the heat is actually passing most rapidly from the body. If the air outside is cool, the comfortable glow produced by alcohol must be maintained by a prodigal expenditure of internal heat. Hence such an effect can be but temporary. Prolonged exposure to wet and cold is better sustained without alcohol, even if the discomfort is made keener by the abstinence. A chilled surface means economy of heat waste and the husbanding of fuel for continuing trial. Alcohol may be used to lessen the misery of a short exposure to intense cold, but should be avoided in cases where the hard conditions are to be borne for an unknown length of time. It is better, in general, to suffer than to depend on this treacherous support.

The increased blood flow in the skin which is so striking when alcohol is taken certainly tends to relieve internal congestions. There is no question that this is an action of great value when the object of the dosing is to ward off a

cold or some more serious effect of exposure to the weather. It may even serve to check the onset of such troubles when the first symptoms have appeared. It is useful in intestinal disturbances where the correction of congestion is again the main factor in the cure. For the best results the patient must have rest and warmth, preferably in bed, during the treatment.

We have now to speak of alcohol as a "mental alterative." The term has been chosen rather than "cerebral stimulant" for reasons that may appear. Whatever else is claimed, the effect chiefly sought in drinking is upon the brain. This effect is generally but inaccurately described as stimulation. But a stimulant is best defined as an agent which increases working capacity. Alcohol probably does this for the stomach, as possibly it does for the heart and the muscles in general, though the reaction follows soon. Its influence on the mental processes is scarcely to be regarded in the same way. A true stimulant for the brain should increase the power of sustained attention and consecutive, orderly thinking. Few would claim for alcohol such a property as this. The word "dissipation," which we use for intemperance, is a very precise one. Scattering rather than concentration of thoughts is the mental habit from first to last. Perhaps a man may be at his best socially when he is not at his best logically. There is a degree of attractiveness in the workings of a slightly inconsequent mind. We are amused by unexpected associations. A little alcohol lessens self-consciousness, with the result that the subject speaks without reserve and without confining himself to what is important. Conversation is diluted with trivialities. We may admit that this is somewhat enlivening.

But how much the animating potency of wine at banquets is overestimated! There is a simple reason for its undeserved reputation, and this is found in lowered standards of judgment on the part of those who listen to what is said. The ready laughter and applause do not indicate brilliancy

on the part of the speaker nearly so often as readiness to be amused on the part of the hearers. In the midst of such a company the total abstainer feels an amazement verging on disgust as he observes the demonstrations that greet speeches which in themselves are wholly inane and commonly in bad taste. How feeble are the sallies when recalled in "the light of common day"!

The justification of the social use of alcohol must be based on its power to produce this peculiar frame of mind. It removes the consciousness of fatigue and the feeling of care. The attention is limited to the present moment and immediate interests. The faculty of discrimination is dulled, and with the consequent lowering of æsthetic and intellectual ideals there comes a bland self-satisfaction and a naïve admiration for one's fellows. A vigorous writer has called this process "drugging for delectation." Can such an artifice be defended? It is most difficult to answer this question with entire justice to both sides. Perhaps it may be impossible to answer it in sweeping fashion for all men. One who is cynical and pessimistic by nature may really view his affairs more justly and judge his neighbors more equitably while under the influence of wine. This may be true of other temperaments, the neurasthenic, for instance. But the optimist — and may we not say the normal individual? — is not likely to be improved by such an agency. Increased buoyancy and good humor in such subjects mean silliness. If it is true that gatherings of total abstainers are comparatively doleful — as is claimed — the lesson may be, not that alcohol is necessary to good fellowship, but rather that the average nervous system is below par. We doubt whether a man ought to rest content with any lower measure of health than that which will insure the social virtues without chemical aid.

With advancing age it may be unreasonable to demand so high a standard. With increasing infirmities there must usually come a time when comfort rather than efficiency is

to be sought. When it is clear that such a time has arrived there is much to be said in favor of the more or less regular, moderate use of alcohol. It is a great anodyne. Granting this, we may also point out that the beneficent effect in age will be more easily obtained by those who have not exhausted the consolations of alcohol in earlier years.

It seems hardly necessary to dilate upon the poisonous properties of alcohol. That these have been ridiculously exaggerated is obvious: that they are very real is equally clear. The spectacle of drunkenness and the shame and misery that attend it are too familiar. No one who begins to use alcohol can be quite sure that he will always keep within bounds. The temperate lives of his relatives cannot be assumed to prove that he is secure. Susceptibility to the temptation to increase the indulgence is found again and again in young men of clean heredity and high gifts. Hence the only *absolute* safety is in total abstinence. Still, the chances do *not* favor the ruin of the average man who adds alcohol to his diet.

Enough has been said to show how various are the aspects of alcohol. It has been easy to treat them separately in the preceding paragraphs, but no such separation is possible in practice. The undoubted value of the alcoholic relish, its occasional merit as an actual part of the ration, and even its virtue as a drug cannot be utilized without some experience of its cerebral effect and the risk, not always remote, of forming a habit. The hygienic ideal to be sought is a robustness of life which shall make alcohol superfluous as relish, food or drug, and a cheerful, active mind which needs no artificial aid to make it hopeful and sympathetic. The attainment is no easy task. Grief and worry and overwork may be added to an original temperamental difficulty. But the use of alcohol is never more unsafe than when sorrows are the excuse, and never so selfish and cowardly as when the motive is to shun responsibilities that ought to be met. Men do not often see the sinister suggestion in the high

spirits of one who has forgotten his cares for an evening by the most moderate drinking. They do not see that the banished sense of pressing duties is the very characteristic of the drunkard when, developed to a logical extreme, it makes him indifferent to every obligation of conscience and of love.

PERCY G. STILES, PH.D., Simmons College.

DISPOSAL OF MUNICIPAL REFUSE

The latest branch of sanitary engineering which is being developed in our country is the municipal collection and disposal of the solid refuse as distinguished from sewage. In the smaller cities the refuse is either partly disposed of on the premises or dumped on low ground near by, or burned; or the garbage alone is collected by farmers and fed to swine. But in large communities the greater length of haul to suitable points of disposal, and the length of time that elapses until those matters which rapidly become offensive can be effectively disposed of, have lately caused the whole subject to be carefully reconsidered.

It is here intended to briefly review the question and to indicate the lines along which this municipal service is being improved.

The solid refuse consists of garbage, ashes, rubbish, street sweepings, night soil and dead animals. It is not intended to include the latter two classes in this discussion.

Garbage is, in several respects, the most important part of municipal refuse. It comprises chiefly the food wastes from kitchens, markets, and includes also the slaughter-house refuse. It consists almost entirely of organic matter and moisture. The animal matter contained in it rapidly breaks down and putrefies and, therefore, soon causes offensive odors, as the oxygen in the air is not sufficient in quantity to

prevent putrefaction, particulary during moist and warm summer weather.

Among the different classes of refuse, garbage, when it is fresh, has the greatest commercial value, because it contains animal food. It also contains about three to four per cent of grease, which is sufficient, under suitable conditions, to pay for its extraction.

If not cared for properly, garbage creates a greater nuïsance than any other refuse, and its treatment has been discussed most frequently. There has been more difference of opinion regarding this treatment than that of any other class of refuse.

Ashes comprise the mineral waste left after the combustion of coal. The amount varies, of course, with the season, and also with the latitude, more ashes being produced during winter than in summer, and more in northern than in southern latitudes.

Ashes contain a large amount of unburned coal, which also varies greatly in quantity. From the average dwelling houses in the United States it is found that about twenty-five per cent of the ashes is unburned coal.

The objectionable part of ashes is the dust, which is apt to become a nuisance when the wind is brisk and when the receptacles or carts are not properly covered.

Rubbish is usually designated as the material which comprises everything that is not either garbage, ashes, street sweepings, manure or night soil. It contains a greater variety of materials than any of the other classes of refuse, and varies greatly in quantity.

Street sweepings is the material removed from the street pavements, and consists chiefly of horse droppings and of dust which settles upon the pavements, or is created by the traffic. Under this heading we often also class the manure collected at stables, and also the snow falling upon the streets, which, however, will not here be considered.

In discussing the proper collection and disposal of municipal

refuse we must consider all questions concerned from three points of view, health, nuisance and cost. If we can satisfy the general demands under these three heads the problem has been properly solved.

Health is affected by pathogenic germs, which may be contained in the refuse.

Ashes are quite free from them because they are the result of combustion. Garbage should not be considered as dangerous from the standpoint of health, because it consists of kitchen refuse where disease germs would not be found, except in the rare instances of diseased meats or vegetables which may have been improperly brought into the kitchen.

Street sweepings and manure are more dangerous because they may contain disease germs, particularly when the sweepings come from densely inhabited parts of cities.

Rubbish may be the most important part of municipal refuse from a health point of view. It contains the sweepings from houses where perchance there has been sickness or death; it may contain discarded bedding upon which there may have been death, and discarded articles which may have been in use by diseased persons. It is, therefore, to be looked upon with suspicion, and its safe disposal should be most carefully undertaken.

Nuisance is caused generally by the material being mal odorous or offensive to sight.

Garbage, if not removed in summer within twenty-four hours, becomes foul and objectionable. Ashes are liable to be a nuisance while collecting and dumping from the dust which the wind blows about.

Rubbish has generally no bad odor. But it can be a nuisance from its objectionable appearance when dumped promiscuously upon fields, allowing paper, straw and other light materials to be blown about and disfigure the ground in the neighborhood.

The *cost* question is an equally important point for the engineer to consider. He might recommend an entirely

efficient disposal to subserve the conditions required for health and for preventing of nuisance, but it might be at an expense which the community cannot afford. He is, therefore, required to advise the least expensive method of preventing sickness and nuisance, due to the collection and disposal of the various classes of refuse which have been enumerated above.

As the element of cost is essential, we must appreciate that a final disposition which requires long hauls for collection and delivery may be more expensive than another one which requires a short haul. The question of haul must, therefore, be considered together with the method of disposal, and may often determine the character of the latter.

The cost element must likewise decide whether the collection and disposal shall be separate or mixed.

We shall now briefly indicate the least expensive methods which can be employed to dispose of each of the different parts of refuse separately so as to prevent sickness and nuisance.

Ashes can always be used for filling and for road making, or mortar when in proper condition.

Garbage, if kept free from refuse and if collected and delivered promptly, can be fed to swine without endangering their health or creating a nuisance. It can also be plowed or dug into the soil, which, when freed from metals and large entangling objects, is quite a satisfactory disposal. If the soil is sand or acid, an improvement of the same is obtained.

The extraction of grease has also been more or less successfully conducted in many of our cities; but as a nuisance cannot always be prevented in the process, the reduction works should be, and usually are, located at isolated points.

Cremation or incineration is another method of disposal. As garbage contains from seventy to ninety per cent of water, it is not self-combustible. It is necessary to add a marketable fuel, such as coal, oil or gas, which generally raises the cost to a prohibitory degree. It is, therefore, more customary

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and economical to mix the garbage with other more combustible refuse, as stated below.

Rubbish. Its usual disposal is largely by dumping. It is sometimes incinerated, but dumping is still most common, which is an objectionable process. The possibility of conveying disease germs is great, and if used for filling its lack of compactness causes it to settle for many years, so that meantime the land cannot be utilized for any other purpose. The best and only sanitary disposition for the rubbish is to burn it in furnaces specially built for the purpose. By properly conducting the incineration all disease germs are destroyed and all nuisance can be prevented.

Street Sweepings and Manure. Street sweepings and manure can be dumped for filling low land, and in many cases this disposal has been quite satisfactory. Where they contain sufficient manure to be combustible, they have been burned. Danger to health and nuisance can be prevented by a proper method filling or by burning.

When it is found that incineration can economically dispose of several or most of the above parts of the refuse, it will be most economical to mix them and burn them in a single furnace. This is done successfully, for instance, a at Westmount, Montreal; Vancouver, British Columbia; West Brighton, N.Y., and Seattle, Wash.

In conclusion it should be repeated that in order to decide upon the best system for any city, it is necessary to ascertain, first, the cost of each sanitary and practicable kind of disposal; and, second, the cost of collection and delivery to the respective point or points of disposal. The least expensive combination will indicate the system to be preferred.

RUDOLPH HERING.

THE AMERICAN HEALTH LEAGUE

All sanitarians must be watching with interest the active educational and political campaign which is being carried on by the American Health League. "The public health" is a phrase to conjure with, and public sentiment can be aroused to almost any pitch by popular agitation for prolongation of human life. It is doubly necessary, therefore, that this powerful engine for good should be wisely used.

With regard to methods, it is of great moment that the present waste of life capital and the possible improvements due to sanitary reforms should be fairly and moderately stated. Overestimates of the extent of existing negligence and of the power of potential remedies tend to react against the whole cause of sanitation. Furthermore it is important that a sense of proportion should direct the preparation of educational literature along these lines. There is danger that undue emphasis may be laid on certain sanitary dangers, to the neglect of others of far greater consequence. The pure food agitation, for example, must find its main justification on economic and moral rather than sanitary grounds. There is only a certain amount of energy and money which can reasonably be demanded for sanitary progress in the coming decades. It is essential that this should be wisely focused on those points where a maximum result can be attained.

Again, in regard to the ultimate objects of the sanitary campaign it is clear to professional sanitarians that efficient local organization is the thing to be aimed at rather than Federal regulation. The Public Health and Marine Hospital Service is doing splendid work in studying the problems of the District of Columbia, in investigating scientific questions bearing on sanitary science and in disseminating the

information it acquires. This bureau should be strengthened for the functions of research and education. It might perhaps, as has been suggested, receive an appropriation equal to that so wisely expended by the Department of Agriculture. There is a sharp line, however, between advice and control. Sanitary control must, from the magnitude and variety of the problem, be a local matter. The suggestion that the milk supply of the United States should be inspected and pasteurized by Federal authorities is so chimerical that it tends to discredit the whole movement for sanitary reform.

The important problems of sanitation are local problems. The reform of water supply and sewage disposal systems is beginning to be well handled by State authorities; and interstate questions can be competently dealt with by coöperation of the States (as New York, New Jersey and Pennsylvania are at present coöperating). Efficient health administration in cities and towns (perhaps in counties in the rural districts) is the great desideratum for dealing with housing and factory sanitation, with milk supply and other food supplies, with the prevention of excretal pollution, with disinfection and the isolation of disease. No greater service could be done by any public-spirited citizen in furtherance of sanitary development in this country than the organization in local branches of societies for the moral and political support of local health authorities, especially those who have developed themselves as professional hygienists, for an immense amount of accurate information and progressive administrative ability is now unused in such places because of the lack of public opinion to indorse and carry through reformatory measures. This is perhaps the greatest lack which can be supplied in any way by lay effort at the present time in hygienic circles.

C.-E. A. WINSLOW.

THE REVIVAL OF FIELD INSPECTION

With the rapid development of sanitary work and the tremendous demands made by the public upon the health departments of the country, it has been impossible to appreciate at their proper value each specialized department in sanitary lines. The men demanded by the immediate pressing obvious necessities have naturally been trained first, such as executives, vital statisticians, engineers and laboratory workers, but only in limited numbers the field men. It is gratifying to see that an effort is now being made, by some departments at least, to train the field man for the various duties connected with this work, and that it is gradually becoming recognized that highly trained men are as necessary for field work as for office or laboratory work.

The field information in reality sets the foundation for the analytic and statistical work to follow, and naturally should be secured with the greatest of care and by individuals trained along this special line of work. Take, for instance, the study of a sanitary water problem. Good field information is of vital importance, since it shows the actual existing conditions in the specific case in question, and such field information must be used as a basis for the conclusions drawn from the bacteriological, chemical and physical examinations of the samples collected, if specific and definite conclusions are to be reliably reached. The tendency, which developed at the beginning of analytical water work and in some cases has continued to the present day, is towards a neglect of the field data to back, account for or explain the conclusions drawn from the analyses. The initial step was in the direction of *getting the sample*, regardless of who collected it or who supplied the necessary information, and then

immediately proceeding with the analyses, on which alone the report was almost entirely based. The evils of the disregard of field data may readily be shown. If the presence of *B. coli* in water, for instance, indicated clearly in every case the exact origin of the bacillus, no field data might be needed to condemn a supply in those cases where simple bacterial analysis showed *B. coli*. But it is not true that "*B. coli* present" always means serious contamination. A careful examination of the surroundings often demonstrates clearly that the *B. coli* present was derived from animal sources rather than from man, in which case a different conclusion should be given. The collection of field data together with the proper collection of a representative sample, either chemical or bacteriological or both, is a study by itself and should not be assigned to untrained hands. The indiscriminate distribution of sampling outfits, both bacteriological and chemical, to individuals who have never before collected a sample is certainly unsatisfactory, to say the least.

The reason given for not sending properly trained men to do the obviously necessary field work whenever the investigation demands it is in most cases credited as economic, but the continued use of such methods is surely poor economy. It is easy to see that the erroneous condemnation of a single water supply will quickly offset the necessary expenditures for many proper investigations. Let us hope that the day is past when the man sent into the field for duty is not merely that member of the staff whose time is least occupied on the day of need, regardless of his training.

What applies to water investigations applies also in work on epidemiology. This line of investigation alone presents room for a lifetime study. The problems involved in securing and interpreting the necessary data on which to base conclusions become extremely complex. Each investigation will probably require an entirely different line of study. The location of the source of infection may involve much more

than the mere listing of the cases and the study of their relation to various foci of contamination. It may necessitate a detailed sociological and economic study of the people involved. So again we have a field problem requiring a man especially trained for the work. It is impossible to conceive of one individual being trained to cope with all field problems, so this necessarily means a division of the work. This division of work naturally means the introduction of the specialist who is in a position to deal with his specific line of problems intelligently. Public health work must necessarily, sooner or later, develop this specialistic side in field work as in all others as the demands increase, and certainly the public will benefit tremendously by such a development.

H. A. WHITTAKER.

EDITOR'S NOTE. — This editorial gives opportunity to suggest a subject distinct from that treated above, yet somewhat parallel. In many municipalities extreme need exists for a revision of the ordinary bureau of "sanitary inspection," often in the personnel, often in the organization of the bureau, but most often and of chief importance in the training of the inspectors themselves. When it is remembered that the contact of the ordinary citizen with the health department — all that the ordinary citizen ever learns by personal experience of the existence and work of the health department — is based upon dealings with the sanitary inspector, it is not astonishing that the public should have formed in many cities a very low estimate of health department efficiency. An eminent health authority may be commissioner, highly-trained men may act as medical inspectors, epidemiologists, vital statisticians, laboratory workers and engineers, but if the standard of the sanitary inspector is low, the ordinary citizen, knowing nothing of the former, but in daily contact with the latter, cannot be blamed for the skepticism too often found prevalent amongst the mass of citizens as to the knowledge, capacity, power and willingness to act of the ordinary city health department

SPECIAL ARTICLES

A SIMPLE PROCEDURE FOR THE DISINFECTION OF PASSENGER COACHES AND TO KILL VERMIN IN THEM

By JOHN A. AMYOT, M.B.
Toronto, Canada

The disinfection of railway coaches is usually incomplete, and much difficulty is experienced in killing insects, especially in the cars of suburban lines.

Formaldehyde, from commercial formaline, is the gas best suited to disinfect, aërially, rooms and such places. Hydrocyanic acid generated from the decomposition of cyanide of potassium by a mineral acid, has proven the most efficient material for killing vermin, such as bedbugs, fleas, lice, cockroaches and mosquitoes. In order to use these substances efficiently, it is necessary that the rooms be so well closed that there is practically no loss of gas, so that a sufficient exposure to a sufficient concentration of the gases be obtained. For formaldehyde disinfection a temperature of from 60° to 70° F., and a relative humidity of at least 70 per cent at the temperature of disinfection are required. In passenger coaches, on account of the many windows, doors, ventilators, pipe openings and various other fixtures, it is next to impossible to make them gas tight and to secure regularly the requisite humidity. All of these difficulties could be overcome by placing the car in a practically air-tight house, one that could be cheaply built of light framing and corrugated iron externally, and with tin or galvanized iron soldered at the joints to make it air-tight. This need not be much larger than the ordinary coach. It could be

made large enough to receive two or three coaches, if such be desired. It would be an inexpensive structure. The door only need give any trouble to complete closure. The car or cars placed in this chamber may have all of their doors and windows opened wide. The requisite amount of humidity in the air could be secured by ordinary sprinkling pipes being attached to the sides of the chamber some eight or ten feet from the floor. Water dripping down the wall and down to the floor and left there for fifteen or twenty minutes would very soon bring the air up to the humidity required. The water then could be run off towards a sump hole, which could very easily be drained over to a sewer. An ordinary steam coil would give the required temperature. A chamber at the side of this disinfecting house could be placed in which the formaldehyde could be liberated and driven by fan into the disinfecting house. The chamber would also serve the purpose of an observation look-in. A couple of small fans in this house could be placed so as to mix the formaldehyde and air uniformly throughout the chamber. The gas would then reach all parts of the exposed bedding, cushioned chairs and seats, the inside and outside of the car and lavatories as well, with the least amount of gas expenditure. The exposure could be made as long as desired. An hour would serve all purposes. The formaldehyde, which is so objectionable in odor, could then be removed very rapidly by a suction fan at one end of the chamber and an inlet fan at the opposite end. Both of these, while disinfection is going on, could be kept closed off to prevent loss of gas. To kill vermin the cyanide of potash could be decomposed in the same chamber as the formaldehyde was liberated from, and by the same fan be driven into the fumigating house, and when the half-hour's exposure had been complete could be pushed out and drawn out by the fans mentioned for the extraction of the formaldehyde gas. In this way perfect disinfection and complete insecticidal action could be secured at a minimum cost of apparatus, material and building.

MEASURES TO PROMOTE THE HEALTH OF SCHOOL CHILDREN *

MARSHALL LANGTON PRICE, M.D.
Secretary State Board of Health of Maryland

School children deserve especial consideration from hygienists mainly for three reasons: fiirst, age; second, conditions of overcrowding and close contact; third, special conditions connected with education. The educational period may be regarded, as far as school children are concerned, as extending from the fifth to the fifteenth year. This age period is unique from a hygienic standpoint for two reasons. At the age of five years an individual should have his greatest expectancy of life, considerably greater, in fact, than he has at birth. In this period we find a lower mortality rate than at any other period of life. On the other hand, in this period we find generally the highest morbidity rate, and this morbidity is almost wholly due to communicable and hence preventable diseases. The great bulk of these diseases among school children can be divided into the minor infectious diseases, especially acute exanthemata, and the more serious chronic diseases, which seldom become manifestly evident in school life, but exercise serious effects on the after life of the child. As the educational period is the largest determining factor in the future efficiency of the child's mind, so the school period is the time during which the future efficiency of the body is decided for good or bad. "As the twig is bent so is the tree inclined," and this is as true of the body as it is of the mind.

Hygiene, as taught in the public schools, is a sinister

* Read before the American Public Health Association at Winnipeg, August, 1908.

practical joke. The cursory and indifferent attention paid to hygiene can be evidenced by any school curriculum. The garbled and inferior text-books are devoted largely, in many States, to the effects of alcohol on the human system, with a calm and magnificent disregard for the urgent problems which enter our daily life, such as the prevention of tuberculosis, typhoid fever and acute infectious diseases. No one familiar with the subject can deny that the State has failed lamentably on this urgent and fundamental principle of education. The hope for future hygienic progress, not only for school children, but for the community at large, must lie in the education of our future generations to such a knowledge of self-protection against death by disease as they now have against death in its obvious physical forms. The remedies are self-evident, and can be briefly stated.

First, to teach real hygiene in schools, by teachers who have a thorough knowledge of the facts, and have the rare ability to impart them to the minds of children. Second, to sweep our present farce out of the schools, and consign it to the junk heap, where it belongs. In this enlightened and progressive age we have no right to give children dead and mummified superstitions as the living truths of hygiene. I think we, as health officials, are now all awake to the importance of hygienic education for the public, but we have, as a class, been slow to grasp the fact that we must make our impression at that time when the mind is "wax to receive, and marble to retain." And we must all never fail to reiterate the fact, which all human history has shown, that advance in hygiene cannot very far proceed the enlightenment and intelligence of the people.

I will refer briefly to the medical inspection of schools. The most serious defect in medical school inspection is paying physicians small salaries to do patchwork. Specialization in work of this character is no longer merely advisable, it is imperative. Medical school inspectors can, at present, only be expected to recognize obvious acute diseases. No one

can deny the importance of even this form of imperfect inspection, but it is not to be compared in importance with the recognition of latent and chronic disease. The school period is the period of latency for many serious chronic diseases, first of which in importance is, of course, tuberculosis. The vast majority of these diseases could be arrested before their development if proper methods were instituted as soon as the diseases were recognized. Special schools should be established for children with bodily or mental defects, the latter under the control of an expert psychologist. In the case of eye defects, a special school should be provided where the lighting facilities are abundant, special type provided for books, and frequent periods of rest interspersed among the school hours. It is both cruel and unscientific to try and force children with such serious handicaps through the same course of instruction that is applied to sound children. Children with defective hearing should be instructed in small classes in rooms of good acoustic properties, and proper use made of graphic methods of instruction. We are only beginning to realize the constant mental and nervous strain imposed on school children with defective hearing.

Evident tuberculosis is generally uncommon among school children, with the exception of tuberculous bone disease, but it is only the trained expert who can realize how common latent tuberculosis is among school children. It is important that these latent cases should be recognized, both on account of the children themselves, and on account of those exposed to them. Because latent tuberculosis is discovered in a child, there is no reason why such a child should not receive an education, not only without physical injury, but often with actual benefit. For this class of cases out-of-door schools should be established, in parks or suburbs, the children taught in small classes, for short hours, with frequent intervals of rest. Rigid desks and chairs should be abolished for this class of children, and comfortable easy-chairs used, to allow rest and relief from bodily strain. Serious diseases

and defects could be prevented in later life by keeping careful anthropological data concerning each child, and by transferring those showing improper bodily development temporarily to special schools.

Because it is universally neglected, I am referring specifically to "school hygiene," which includes such general problems as heating, lighting and ventilation, exercise, rest and recreation, water supply, and the spread of communicable diseases. The hygienic principle most outraged in our public schools is proper ventilation. Through reasons of economy and convenience, the children are crowded into schoolrooms in numbers three, four, five and even ten times in excess of what their health demands.

The greatest general evil in school life is promiscuity. This is natural to children, and it is unfortunately encouraged under our present school system. Several of our States have laws providing for the issue of free schoolbooks, which are passed around among the scholars until they become so dirty and torn that not even a child will willingly handle them. The issue of free schoolbooks is so little of a blessing that I would gladly see them abolished everywhere, as more than any other factor in school life their principal function is the conservation and propagation of disease.

Probably next in order in efficiency in propagating disease is the public drinking fountain or water cooler. It has been found, on our naval vessels, where the conditions of overcrowding and promiscuous intercourse are similar to those obtaining in schools, that it is impossible to prevent the spread of acute infectious diseases as long as common drinking vessels are employed. To meet this condition individual drinking cups, jet fountains, or the sterile pipette system should be adopted A proper place should be provided for children's lunches,—a clean place screened against flies, — and it should be made a violation of school discipline to exchange articles of food as well as wearing apparel, slate pencils, slates, sponges and other articles

of personal use. The hygienic evils inevitably connected with the school life should be realized and met actively and vigorously, and not with passive supineness. The evils of overcrowding should not be intensified by building schoolhouses in narrow, dark alleys or streets. Every public school should mean a public park, whether under the control of the Park Board or the school authorities. The hygienic arrangements of each school should be subjected to rigid inspection, as this in itself would have important educational value. These simple principles are not extravagant or impracticable, and I believe that our generation will see the majority of them actually accomplished. We have enacted laws regulating child labor because industrial conditions are recognized to be harmful to the bodily development of children. Let us, at least, see that the children that we have removed from shops and placed in schools, are under hygienic conditions at least as good as those from which they have been removed.

MEASURES TO PROMOTE THE HEALTH OF SCHOOL CHILDREN *

By SAMUEL G. DIXON, M.D.

Commissioner of Health of the Commonwealth of Pennsylvania

At the last session of our Legislature the opponents of vaccination, represented by a paid lobby, were putting forth strenuous efforts to convince the legislators both of the futility and the danger of vaccination. Their efforts, I regret to have to say, were so far successful that they were able to procure the passage of a bill to repeal the law making vaccination a prerequisite to admission to school. Fortunately, however, Pennsylvania had a chief magistrate who was not to be swayed by either popular clamor or cheap sophistry, and who set the seal of his condemnation on this action, and thus saved the Commonwealth from a great calamity.

The work of protecting our school children from the scourge of smallpox has, therefore, gone steadily on and, with very few exceptions, with the approval of our people.

Any one who carefully examines the official compilation of the common school laws of Pennsylvania cannot fail to be impressed with the fact that the State, while recognizing the prime importance of the education of the minds of her children, is, at the same time, deeply concerned for the preservation of their health and has, therefore, made it the duty of those who are intrusted with their instruction also to use every possible reasonable means of training up a sturdy

* Read before the American Public Health Association at Winnipeg, August, 1908

and vigorous, as well as intelligent race of citizens. I presume she is by no means alone in this particular.

This care begins with the construction of schoolhouses, which are required to be of sufficient number, in healthful locations, comfortable, well heated and well lighted, providing at least fifteen square feet of floor space and two hundred cubic feet of air space for each pupil, and warmed to maintain an average temperature of 70° F. in the coldest weather. An abundant supply of water "for fire and sanitary purposes" as well of pure water for drinking must be assured. The sanitary conveniences must be properly constructed, kept clean and free from offensive odors, and arranged with due regard for the morals of the children.

As the aggregate intelligence of the State is superior to that of the average parent, it naturally adopts a higher standard for the care of the child's health than that of the average parent. Especially is the law careful to protect the children from contagious diseases. The teacher is required to exclude from school not only every child suffering from such diseases, certain of which are specified, but also any child or person belonging to or residing in the same house in which any person may be located who is suffering from any of said diseases, and such exclusion must continue for a sufficient period following the discharge by recovery or death of the person last afflicted in said house or family, or his or her removal to hospital, and the thorough disinfection of the premises.

The directors in cities are also required to disinfect the schools at regular intervals.

In order to maintain the health and bodily vigor of the pupils, calisthenics and athletics are made a portion of the training, and in order that the pupils may understand the importance of the proper care of their bodies, physiology and hygiene are part of the regular curriculum.

When, by reason of distance of the schools from their homes or inaccessibility, the children would be subjected

to too great fatigue or exposure in going to and from school. the directors are authorized to provide conveyance for their transportation.

I take it for granted then that sanitarians, physicians, legislators and school directors are all alike agreed that proper ventilation and heating, a sufficiency of air space, an abundant supply of pure water, proper sanitary appliances and clothing accommodations are essential measures for promoting the health of school children, and shall not return to them again. Rather would I call your attention to hidden dangers to health which are too often ignored or neglected.

A second important means for promoting the health of school children is the immediate reporting of all cases of communicable disease to health officers by physicians. It then becomes the duty of the health officers to at once investigate the school relations of families in which such diseases are reported to exist, and to notify the teachers of all schools which are thus in danger of infection, whether by reason of the attendance of other children from the same families, or of books or other articles having become infected by the child whose illness is reported.

One communicable disease I desire to mention with especial emphasis because its presence in schools is not sufficiently recognized. I refer to tuberculosis.

Dr. John Lovett Morse of Boston has stated that large series of autopsies in children show tuberculosis in from twenty-five per cent to thirty-five per cent.

Kirchner, in a recent table based upon Prussian statistics, shows that a sudden increase in tubercular mortality commences at the fifth year and progresses rapidly, showing that in that country, at least, "certain conditions enter into the child's life during the school period which enormously increase the risk of dying of tuberculosis." Many of the inscrutable nameless fevers of childhood are due to tubercular glandular affections.

In the *London Lancet* for Dec. 28, 1907, in a paper by Drs.

Lecky and Horton, entitled "Revealed Tuberculosis in Children," it is stated that in the city of Brighton in the three years, 1904, 1905 and 1906, the annual notification of cases of pulmonary tuberculosis, between the ages of four and fifteen, was at the rate of 190 per 100,000 of population, which would be almost two per cent of the population at school ages. Unfortunately, beyond that age all deaths are computed together, so that it is impossible to determine the rate among the older school children. The number of deaths, however, is small, which bears out the theory that when the disease is discovered in its incipiency in child life it is very amenable to treatment; but this is offset by the fact that the number of deaths from other forms of tuberculosis at that age was comparatively large.

In the town of Blackburn, 1,028 school children were referred to Dr. A. Greenwood, the Medical Officer of Health, by the school attendance officers, for determination as to their fitness to attend school. Of these 11.8 per cent were found to be suffering from tuberculosis. This investigation covered a period of three years, from 1903 to 1906. During the first year the tuberculosis percentage was 16; during the second, 6.8, and during the third, 12.5. Of these cases 6.7 were pulmonary, and 5.1 per cent of other forms.

In the *Journal of the Outdoor Life* for May, 1908, Dr. Ellen A. Stone, Medical Inspector of Schools of Providence, R.I., in concluding an article describing the Fresh Air School in that city, pertinently says: "In the light of the amount of tuberculosis found at autopsy in children dying of other diseases and from accident, we must recognize the fact that many school children are carrying about hidden foci of this disease, and is it not probable that those who are suffering from anæmia, debility, etc., are likely to be the ones?"

In the city of Cleveland, out of 500 children examined, twenty per cent show by physical signs that ganglio-tuberculosis exists.

Roux and Josserand found forty-four per cent of school

children examined in Paris and Cannes were tuberculous. A European observer declares that:

"From the third to the fifth year tuberculosis occupies a fourth place with reference to causes of death.

"From the sixth to the tenth year tuberculosis occupies the third place.

"From the eleventh year on tuberculosis occupies the first place."

I confess that these statements appeared to me exaggerated, and I was inclined to doubt whether they would be borne out by figures gathered in this country. I therefore consulted the statistics of my own State on record in our own Bureau of Vital Statistics, and to my surprise found that they fully sustained the reports of European observers. In the year 1906, out of 9,258 deaths from pulmonary tuberculosis, 1,456, or more than fifteen per cent, were of persons under twenty. If the deaths from tubercular meningitis, marasmus and tubercular diseases of the bones were added, the percentage would be considerably increased, although not always, it is true, by children of school age.

Of children over five years of age and under nine, 89 died; of those between nine and fourteen, 166; and those between fourteen and nineteen, 784; showing a most alarming increase during the latter period of school life.

The comparative mortality from the other contagious diseases diminished with corresponding rapidity, just as in European countries, until in the later five-year period of school life only 44 died of diphtheria, 19 of measles, 11 of scarlet fever, and 2 of whooping cough.

Brouardel states that one-fifth of the teachers of Paris are tuberculous. I cannot believe that this condition would be revealed by an investigation in our own schools; but we owe it to our children that an investigation of this question should be made.

Tuberculosis in children is, fortunately, very amenable to treatment. "It is, in fact, very susceptible both to favor-

able and unfavorable influences, so that," as Dr. Lowman says "it is a fair inference that unhygienic conditions must be reckoned among causes of the disproportionate increase of cases during the school years."

From our present knowledge of the conditions essential to the cure of this affection, we are warranted in the conclusion that overcrowding and lack of ventilation are potent factors in bringing about this unfortunate result. Lowman says, and you will all agree with him, that "the transition of a child from a free, unrestrained life in the open air to a room deficient in oxygen and with an excess of carbon dioxide, must have an unfavorable general influence." But even more dangerous than the gaseous carbon dioxide are the organic effluvia which are given off from the lungs and body.

Up to the tenth year the health of all the children should be the object of special solicitude because of the frequency of tracheo-bronchial tuberculosis, while from the tenth to the fifteenth year special attention should be directed to the increased danger from pulmonary consumption; but I trust that enough has been said to convince you that tuberculosis, or consumption, is a very real peril to our school children.

An examination by an expert physician of such children as belong to consumptive families, or are living in the same house with consumptives, or suffer from persistent cough, or give evidence of gradual failure of health may, in many instances, discover the early symptoms of this fatal disease at a stage when it is readily curable. It can early determine, should such unhappy discovery be made, whether the disease is in such a stage as to be communicable, and thus make it necessary to exclude the child from school. It is just here that the Pennsylvania Legislature, at its last session, adopted a measure which will prove of the greatest service for protecting the health of school children through the Department of Health.

Up to the present time opportunities have not occurred,

even in large cities, and still less in rural districts, by which families in moderate circumstances could avail themselves of the services of an expert. The appropriation of the sum of $400,000 to the department for the purpose of establishing a Tuberculosis Dispensary in every one of the sixty-seven counties in that State, fully equipped with all modern means of diagnosis, and availing itself of the best medical talent in the country, puts a new aspect on the question. The teacher or school physician who is in doubt as to the character of the disease, in a child who is steadily deteriorating in health, will simply need to report to the parents and urge them to provide for the transportation to the country dispensary, always situated in the most accessible town in the country, in order to have the case decided, and also to have the best possible advice for curing the case should it prove to be as suspected. It is only in childhood that we can look forward with absolute certainty to the cure of tuberculosis.

There are other conditions, however, which, while they may not directly threaten the life of a child, interfere most seriously with his growing up to be a useful member of the community. Adenoids, defective hearing and defective vision all play their part in retarding children's progress in their studies. Every one knows the stupid, heavy expression of the child whose throat and nasal passages are filled up with adenoids, and how not only dull, but even depraved they become. We have all heard of the unhappy boy who voluntarily presented himself at a clinic, asking to "have them things cut out of his throat what made him tell lies." Not less hopeless is the condition of the pupil who fails to hear or see distinctly. Laughed at by his fellows, frowned on by his parents, punished by his teachers, at the foot of his class, he goes on bearing his heavy burden, sullen and despondent or wildly reckless, unsuspecting that he is not as other children are.

I would say, then, that the sixth measure is the systematic inspection of school children by a physician, supple-

mented in all large towns by the services of a school nurse, and where necessary and practicable by the skill of an expert in the diagnosis of tuberculosis. Such a system successfully inaugurated throughout the length and breadth of our continent would, I am confident, soon make itself evident in a noticeable narrowing of the broad swath annually cut through the columns of our school children by communicable diseases.

DISCUSSION

DR. JAMES D. LAFFERTY of Calgary, Alberta. Our rules and regulations in the province of Alberta, now ready for sanction, provide for the examination of school children twice a year by the municipal health officer, and in the outlying localities and villages by a paid health officer. In the cases of children whose parents, from poverty or any other reason, are not able to pay for medical attention recommended for the trouble or disability from which they are suffering, the treatment of them devolves on the municipality through the health officer; and in the outlying districts where there is not a health officer, but only a traveling inspector, who may see the child only occasionally, the responsibility of looking after that child and taking care of it is laid on that district, so that all children, whether the parents are able to pay for medical attention or not, receive medical care. We are providing for the appointment of medical inspectors, who shall give their whole services to the work of this department. When they receive the appointment they shall undertake to qualify, from time to time, in the various departments of sanitary science, and to the extent of being able to examine for visual defects and correct them, so that in a short time we expect each one of these inspectors to be a sanitary expert, and to perform all of the duties of a specialist.

DR. JOHN N. HURTY of Indianapolis, Ind. Very recently a woman complained that the sight of her elder

daughter was ruined in the schools or, at least, materially damaged, on account of insufficient and wrong introduction of light. She said that there was not a sufficient amount of light, and that eye strain had resulted.

Reflex nervous trouble had followed this eye strain, with the consequent reduction of nutrition, and finally the invasion of tuberculosis. Two physicians stand ready at any time to testify their firm belief that this impairment of health was brought about by the unsanitary conditions at the school she attended. The mother consulted a prominent attorney on the subject. He sent for the members of the State Board of Health for a conference, and the conclusion from high legal authority is that here is a case of assault and battery by the school authorities in a township upon a little child, and the mother has sued the township for $10,000 damages. If she succeeds in recovering damages in any sum at all, it will arouse the so-called practical business men to a realization of the importance of school hygiene. I have despaired of arousing the attention of practical business men to this great economic measure, one that is not only economic but humanitarian, except by some such means as damage suits.

HEALTH PROBLEMS OF PROVINCES*

By M. M. SEYMOUR

Provincial Health Officer, Regina, Saskatchewan

ABSTRACT

The province of Saskatchewan, containing as it does 250,000 square miles of territory, with a population of 300,000 people, which is being rapidly added to, has a great many questions with reference to public health which require careful consideration and dealing with.

One of the most important questions which we, in Saskatchewan, have at present to deal with is the preservation and prevention from pollution of our natural water supply. We have already had severe illustrations of the evils which follow from raw sewage being emptied into our rivers and streams. Fifty-six cases of typhoid fever were last year traced directly to the use of water from the Saskatchewan River, which had been polluted by a city emptying its sewers directly into the river.

You, in the older portions of America, know of the disastrous results from avoidable water contamination; you also know of the difficulties of having sewage systems changed after they have been once installed. I intend asking the Government for legislation to protect our rivers and streams. In order that this be done, I think that plans for water supplies of cities and towns, before being carried into effect, should be submitted to the Government for their approval. The same approval of sewage systems should be also insisted upon. The want of some supervision of this kind is already

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apparent in the serious mistakes which have been made by some of the places in Saskatchewan.

One town has recently built a reservoir for its drinking water beside one of the main streets in the place. This large basin is to be left unprotected from all the infected dust which may be blown into it from the adjacent street.

The importance of a supply of good water and proper sewage in lessening typhoid fever has been well illustrated in Regina, where, before the present system of water and sewage was installed, typhoid fever existed to an alarming extent, since which time the amount of the disease has been very small indeed.

The proper inspection and control of milk must be extended throughout the province, as milk is undoubtedly a very common carrier of typhoid infection.

The lessening of the restrictive measures previously in force in some of the States of the South, with reference to smallpox, has given us a few extra cases to deal with. Owing to the general dread which exists among the people, with consequently the easy way of isolating cases, and through the great efficiency and protective power of vaccination, smallpox outbreaks have always been in Saskatchewan very easily got under control.

Diphtheria has been a difficult disease to get under control in some sections, owing to the unwillingness to procure medical assistance and the endeavor to do away with the necessity of maintaining quarantine. These difficulties were principally experienced in the settlements of Menonites and some of the newer arrivals among the Galecians.

The Government supplies antitoxine in all cases where the people may be too poor to procure it themselves.

Some difficulty has been experienced in dealing with scarlet fever through medical practitioners allowing quarantine to be removed too soon; the quarantine law in our province for scarlet fever is from three to eight weeks, or until desquamation is complete. This has been interpreted by some

practitioners to mean that patients can be released from quarantine after the disappearance of the rash.

I now come to a disease of fearful importance on account of its enormous death rate, viz., tuberculosis. There were ninety-seven deaths reported in the province of Saskatchewan last year from tuberculosis. Statistics inform us that for every death which takes place from this disease there are five cases of infection left behind. This is well corroborated by the number of cases of tuberculosis which are at present being reported. This means that in the young province of Saskatchewan there are over 500 cases of tuberculosis, who are more or less in the position of invalids, and all, if they hope to recover, should be treated as such for a considerable length of time.

The mortality from tuberculosis is, therefore, a problem compared with which all other social problems of a medical character sink into insignificance, and it is safe to say that the possible prevention of a large portion of the mortality from this disease is justly deserving of the solicitude, the active, personal interest, and liberal pecuniary support of all who have the real welfare of the people of this country at heart

HEALTH PROBLEMS IN ALBERTA*

By D. G. REVELL, B.A., M.B.
Provinical Bacteriologist, Edmonton, Alberta

ABSTRACT

Alberta lies between Saskatchewan and British Columbia. It stretches from Montana on the south to Mackenzie Territory on the north, thus extending between the 49th and the 60th parallel of latitude. The eastern boundary is the 110th meridian. On the west the southern half is bounded by the summit line of the Rocky Mountains, while the northern half is bounded by the 120th meridian. It is, therefore, about 750 miles long and 380 miles wide in the middle, from which it narrows slightly north and south. The total area of the province is 253,540 square miles; for greater clearness I may say that the width of Alberta exceeds the distance from Buffalo to New York, and its length is greater than from St. Louis to New Orleans. Its area is just a little larger than the combined areas of Virginia, West Virginia, Ohio, Indiana, Michigan and Wisconsin. In other words, it is as big as four Michigans, five Wisconsins, six Ohios or seven Indianas.

This immense tract has an elevation of 5,000 to 10,000 feet above sea level in the mountains in its southwest part, and of 2,000 to 5,000 in its northwestern part. It descends to a level of 1,000 to 2,000 feet in the northeast, and 2,000 to 5,000 in the southeast. The general slope of the province as a whole is to the northeast, and the northern part is much less elevated than the southern. In round figures, the eastern side is about 4,000 feet lower than the western, but

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the descent is greatest near the mountains. The rivers, consequently, have rapid currents (in many places 5 to 10 miles per hour), winding channels and narrow valleys. There is thus not much time for natural agencies to remove any pollution to which the waters might be subjected; and it is, therefore, doubly important to maintain, as far as possible, their original innocence.

Almost without exception the rivers of Alberta have their head waters within the province. We are at the fountain head of the water supply of the Northwest. In the protection of the purity of her water supplies Alberta, therefore, has a peculiar opportunity as well as a very important duty.

Except by those who have experienced it, the climate of Alberta is largely misconceived, because people are so apt to think of climate chiefly in terms of latitude, whereas there are other potent factors. The swing of the pendulum of the seasons in high latitudes is governed chiefly by *temperature*, which in turn depends on the very variable length of the day; in low latitude the length of the day does not change much throughout the year; and the seasons are more largely a result of variation of amount of *moisture*.

In northern Alberta the hours of possible *sunshine* range from 19 *in June* to 5 *in December*. In the southern part of the province the range is from 16 hours sun in June to 8 in December. The period of nocturnal cooling varies inversely as the length of the day. In summer what is added to the length of the day is taken from the night. There is, so to speak, a shifting of the weights from one scale pan to the other. It is fairly true that the greater part of Alberta has a subtropical summer and a sub-arctic winter. The cold of the Alberta winter, however, is not felt at all as keenly as temperature comparison with eastern and southern places would suggest. The dryness, and especially the freedom from wind during "cold snaps," are doubtless the reasons for this. The climate, in fact, as well as the soil, is eminently suited to

agriculture, and while summer frosts have been and are the bugbear of the farmers, yet the history of the other provinces shows that these will diminish and disappear as the soil is more and more exposed to the sun's heat by cultivation.

The influence on the climate of direction of the mountains, of the lower elevation of the northern part of the province, and of the effect of the Pacific Ocean and the prevailing westerly winds is seen in the course of the isothermal lines. As these cross the continent they trend away to the northwest, so that Edmonton, in latitude 53½, is five degrees warmer than Winnipeg and Regina (both about latitude 50) in December, January, February and March; has the same average temperature in April and May; but is 5 to 10 degrees cooler during June to September; and is again warmer than Winnipeg and Regina in October and November. The northern boundary of Alberta is 10 degrees north of Winnipeg and has a mean monthly temperature just 10 degrees lower. The *average summer temperature* of Alberta varies from 55 degrees Fahrenheit in the north to 60 degrees Fahrenheit in the south; while the *mean annual temperature* is 25 degrees Fahrenheit in the north and 43 degrees Fahrenheit in the south.

The development of the Northwest has been carried forward very quickly within these opening years of the twentieth century, largely by the efforts of railway and of land speculating companies, aided by the work of immigration agents of the Dominion Government. This growth is well shown in the census returns for 1901 and 1906. During the intervening five years the cities in Alberta doubled, trebled and quadrupled their population. Five new towns and thirteen villages were formed, and the already existing ones grew from two to seven fold in size. This growth has been maintained since 1906, and the building of new railways makes it reasonable to expect a continuance of it, certainly in arithmetical if not in geometrical progression, for many years to come.

In 1901 Alberta had 73,000 inhabitants, of whom 52 per

cent were born in the province. In 1906 there were 185,000 people here, an increase of 154 per cent in five years. The present most conservative estimate of the population is 250,000 to 300,000, an increase of 35 per cent to 62 per cent in the last two years. The population in 1906 was made up of 74,000 foreigners and 111,000 British. Of these 87,000 were Canadian born, 38,000 were native Albertans and 30,000 were from Ontario, while 24,000 came from the British Isles. Of the foreign born 43,000, over 24 per cent of the entire population, were from the United States. Most of these latter are successful western farmers; many of them are returned Canadians. Eleven thousand of the foreigners were from Austria-Hungary, 3,000 from Germany, 5,500 from Scandinavia and 6,000 from Russia. These Albertans are, for the most part, a select lot of people, vigorous and enterprising. I speak here of the great mass of the people, and do not mean to say there are no undesirables, no misfits.

Coming now to the health problems we find that these are much the same as elsewhere, but are given special character by the local circumstances. In spite of the large immigration into the province from many and widely separated sources, we have little imported communicable disease. We have a good deal of imported tuberculosis, owing to the reputation of the climate for dryness and pure air; but the cheap, home treatment with pure air among friends in the East is proving a better thing than the expensive change of climate among strangers in the West; and in future we will be more concerned with the home-grown tuberculosis which finds good soil, even in Alberta, when people shut out the *fresh air* as well as the cold.

The rapid growth of the urban population makes public sanitary provisions an acute problem, and to meet this need the Government has wisely provided a provincial sanitary engineer to advise and confer with municipal authorities in all sanitary engineering matters. A good public health act has made possible ample provisions in the regulations of the

provincial Board of Health for all detailed legislative public health requirements. A provincial laboratory has been established to aid in the diagnosis of communicable diseases and in the supervision of public water and milk supplies.

I believe we have in Alberta an intelligent population, among whom a campaign of education in health matters of all kinds would be well received. In rural communities personal and household hygiene are of prime importance, and a knowledge of these may be fostered through the schools, the public press and in other ways. In our urban communities the present and future opportunities for good sanitary provisions are very great, because their rapid growth gives a plasticity to all the municipal utilities which is not seen in slow-growing towns. The possibilities contained in this plasticity are further enhanced by the fact that the average of intelligence of the western selected and imported population, including the old timer, is higher than in older home-grown populations.

To my mind the situation in Alberta is extremely hopeful. We have the light of the experience and investigations of the East to guide us. We have an intelligent, law-keeping people, and we have "caught Alberta young." Great, then, is the opportunity, and equally great the responsibility on those whose duty it is to utilize the opportunity.

SOCIOLOGY OF THE MIDDLE AND FAR WEST*

By DR. CHAS. F. FAGAN
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ABSTRACT

Sociology has been defined as "that branch of philosophy which treats of the constitution, phenomena and development of human society." This definition implies a great range of subjects and a very wide field of research.

The Middle West is, of course, in a sociological sense, the older part of this enormous area. It contains the larger cities, is the home of a vast industrial population, supports a large number of people dependent on agriculture, and is probably today the richest part of the North American continent.

The Far West, as we know it, between the broad Pacific and that great serrated barrier called the "Rockies," is a very new country, endowed with wonderful resources, but with as yet a relatively small population. Within the recollection of many living men it was a wilderness. Some residents of the Pacific slope have witnessed the birth of law and order in this great region, as yet, in comparison with its area, only peopled in small spots.

The cause of such rapid development in the Great West — a development such as has taken centuries in older countries — is doubtless due to the phenomenal inrush of population within the past twenty or thirty years. Probably in no part of the world is there assembled a greater variety of races than is to be found in the country under review. Here are brought together, not only people of every continent, but, in appreciable

* Read before the American Public Health Association at Winnipeg, August, 1908.

numbers, of almost every national division of the continents. Every type of humanity, every form of religious belief and many phases of social development are represented. Working side by side in domestic, manufacturing, mining, commercial, agricultural and other occupations, their offspring associated in the same educational institutions, all avowedly entitled to equal rights and equal protection under the law and having innumerable interests in common, this congeries of races will, it appears certain, ultimately be so connected by intermarriage as to gradually evolve a people of a more distinctive type than the "Southerner" or the "Yankee." Whether this new type is likely to be, from a social point of view, as good as the older ones of the North American continent is a matter for question. Whether an admixture of the blood of the Anglo-Saxon, the Celt and the Scandinavian with that of the low-class Slav (*et hoc genus omne*) and possibly with that of the Indian and Asiatic, will produce a population altogether desirable may be doubted.

In regard to the absence or deficiency of moral training in the public schools, the importance of the subject cannot be overrated. It is improbable that the people will ever be unanimously in favor of sectarian or non-sectarian public schools: nor is it, perhaps, necessary that they should be. However this may be, moral science or moral training should be a subject, and take a very prominent place, in the curriculum of the schools. It is possible to instill respect for truth and honor and general good conduct into the minds of youths without encroaching on the tenets of any particular religion or offending any sect worthy of consideration.

The people of Western Canada and the Western United States are an exceptionally bright, quick and capable people; more especially is this true of the agricultural population. Untrammeled by custom and spurred on by necessity, they seem to be willing and able to meet and deal with adverse conditions. In older countries the everyday wants are supplied, the individual seldom thinks for himself and what is

presented is accepted. In this new country, ordinary facilities being absent, the man is thrown back on his own resourcefulness and on his capacity to meet constantly arising and often very sudden contingencies. Necessity, then, has stimulated an independent line of thought, which undoubtedly has developed an exceptional capability. Any observer with open mind will admit this if he has seen the home phases of life, as the writer has in the course of his medical experience in the West.

The home may not have all the luxuries apparent in older countries, yet the solid needs are supplied in abundance; each member of the household has his or her share in the work; the drone in the family beehive is an exception, and family love and family ties are firm. While children leave the parental home at an early age, they are, no doubt, influenced by the prevailing spirit of independence, and are stimulated by the immense possibilities of success open to all who are in good mental and physical vigor. Yet, while this spirit of independence is good, it is to be regretted that youths are allowed to exercise freedom of action at an age when neither discretion nor judgment are developed. The result is that boys of tender years too frequently pass through experiences which men in older countries only know of by report.

A reprehensible characteristic noticeable is the shaping of their own educational courses by juveniles. They attend or leave school at will, and in the selection of a calling play to their young fancies, according to their own whims and very often in direct opposition to their parents' wish. This false idea of independence may right itself in time, but much evil and great suffering in the meantime must result.

The public schools in the West are the product of that independent spirit which dominates all classes. It is recognized that a trained mind is essential to success, and in a country of opportunities, such as ours, it is felt to be but fair and just that every chance should be given to the rising generation in their fight for the better things of life. As a

result of this feeling, a good sound practical education is now open to all, without distinction of class or race.

While on the subject of our schools, a neglect not peculiar to the West should be noticed, — the want of teaching of hygiene. The writer's opinion is that the teachers are unlearned in the science, and that the text-books used are a farce.

The younger generation should be properly and thoroughly instructed in the principles of hygiene, not only that they themselves may reap the benefit, but that as fathers and mothers they may be able to impress their children with a knowledge of the proper condition of living.

At the same time we must condemn the want of adequate teaching as to healthy living, it must be admitted that the intelligence displayed in so many walks of life is not altogether wanting in hygienic matters. Here are some extracts from a Frenchman's review of western life as it appeared to him: "The intellectual and moral aspects of the people are exclusively practical." "Outdoor sports take the first place in the amusements of the people." "From the fine residences which grace the elegant suburbs of the cities to the small wooden houses in the mining camps, we find electric lights, telephones, bathrooms, — an astonishing fact to a European."

A building is said to be a reflection of the wealth and intelligence of the responsible promoter. To a greater extent, then, it may be asserted, are public institutions a reflection of the wealth and intelligence of a people. Such an aphorism is probably true, but, like so many general statements, this one must be qualified. It is to be feared that the words "reflection of wealth and intelligence" are too often misconstrued. Politicians and estate promoters and tourist guides point with pride to our magnificent structures built at the public expense. They delight to explain the architectural beauties and the rich designs, and point to the costly embellished stone façades and marble fittings. No doubt such structures appeal to the æsthete and the artist and are

educationally of advantage. But a question arises here. Might not some of the money expended on these buildings have been devoted to more pressing public needs with greater advantage? We see city halls, public libraries, court-houses, post offices, etc., that cost huge sums of money which, from an architectural and artistic point of view, leave nothing to be desired. Here, then, is where our general statement must be "qualified." Have those who are responsible for these grand buildings made all necessary provision for other more pressing demands? This question might well be submitted for discussion.

However open we may be in this western country to adverse criticism for undue expenditure on unnecessary architectural grandeur, there is one class of building we can point to in honest pride, namely, our hospital accommodation. So far as the writer knows, the West in general is well equipped with hospital buildings. In British Columbia there is no town of any size which has not its hospital, equipped and furnished as completely as any hospital in Montreal or New York. And what is better, there is in attendance a physician and surgeon, not only one who can, but one who does perform with success all the operations known to surgery.

This paper has perhaps trespassed too much on your time, but one more point should be touched on, namely, the difficulties met by the experts in preventive medicine.

In days gone by the greatness of a country was gauged by its wars and their results. When the history of our country is written its greatness will be judged by the results obtained in the development of ideas and agencies which look to the preservation of health and life rather than their destruction.

Contradictory as it may seem of this statement, it may be remarked that the people as a whole, instead of coöperating in matters and movements tending towards the preservation and development of public health, in reality oppose them. This may be explained in a measure by the spirit which dominates in all communities having a representative form

of government, a tendency to criticise and oppose all public measures up to a certain stage. The result in the end is, of course, to obtain the best form of law, although in the process of development injury is being done and lives are being lost. Examples of this are seen in the opposition of a section of the western public to compulsory vaccination, to the use of antitoxine in diphtheria, to the reporting to the medical health officer of infectious or contagious diseases. But in these, as in other matters for the public good, time, patience, firmness and tact, combined with the beneficial results obtained, are the greatest educators. It takes time to educate, and it is for medical reformers to be patient but unceasing in their efforts.

SOCIAL AND PUBLIC HEALTH DEVELOPMENT OF THE NORTHWESTERN STATES AND OF THE WESTERN CENTRAL PROVINCES OF CANADA*

By PETER H. BRYCE, M.A., M.D.

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ABSTRACT

Holding, as we are, our annual meeting for the first time in that region of Canada west of the Great Lakes, it is most natural that our attention should be given to what we may call the natural history of its development, and especially to that of the great prairie region of the North Central States, so similar in its soil, its vegetation, its climate, and in the occupations of its people.

The 1900 United States Census Report states that in 1850 three-fourths of the total value of the farm lands in the United States was east and south of the Ohio Valley.

TABLE I. Showing number of farms and farm values in the North Central States by census records, 1850–1900.

Year	*Number of Farms*	*Percentage Increase*	*Average Value Per Acre*	*Average Value Per Acre for United States*
1850	437,597	.....	$14.59	$13.51
1860	772,165	76	23.39	19.60
1870	1,125,078	45	29.57	21.94
1880	1,697,968	50.9	29.51	22.72
1890	1,923,822	13.3	33.20	25.81
1900	2,196,567	14.2	36.25	24.39

We thus see that the increase in the number of farms in 50 years was five fold, or 100 per cent, averaged for the

* Read before the American Public Health Association at Winnipeg, August, 1908.

five census periods, the great increases being, of course, when the unsettled lands were plenty.

The total farm values for the United States in 1900 were $20,514,001,838. That it was population alone which made these increases primarily possible is apparent.

TABLE II. Showing the increase through immigration during the twenty years, 1880–1900, into the North Central States.

State	*Increase in Foreign Born* 1880 *to* 1890	1890 *to* 1900
All United States	2,628,161	1,151,981
Total North Atlantic	1,073,657	874,619
Total North Central	1,143,285	298,360
Illinois	258,771	124,400
Michigan	155,372	2,227
Wisconsin	113,774	3,228
Minnesota	199,680	37,962
Nebraska	105,128	25,195
N. Dakota (Inc.)	346.7%	(Inc.) 38.8%
S. Dakota (Inc.)	171.0%	(Inc.) 2 %

The marvelous development of these North Central States is seen from the tables. Thus, while between 1880–1890 all the United States has an immigration of 2,678,161, that portion going to the twelve North Central States was 1,143,285, as compared with 1,073,657 to the North Atlantic States. The percentage increase between 1870 and 1880 of immigration to these States had been even greater, not only because of the general commercial depression, but also because the best lands elsewhere were taken up. There was a remarkable falling off of immigration to these States between 1890–1900, the total being 298,360; while Wisconsin, which had received 113,774 in 1880–1890, got but 3,228 during this ten-year period. During the 1890–1900 decade a quite different class of immigration to the United States prevailed, the industrial States, the North Atlantic, getting 874,619. Not alone is the number of immigrants of interest and importance, but its character is of even greater influence on the development of a new territory.

By comparing the percentage of males of voting age in

the North Central States, we find that the total colored population in 1900 was but 2.3 per cent of the whole, the highest being 5.5 per cent in Missouri. We further find, as we would expect, that the older the settlement of any State the larger the percentage of native whites, no matter what their original nationality had been. Thus Indiana, whose settlement commenced with the beginning of the last century by migration from Virginia and Kentucky, had 71.9 per cent of native whites, while Wisconsin had but 20 per cent of native white parentage, 33.8 per cent of foreign born parentage, and actually 45.1 per cent of foreign born, only being exceeded in the percentage of the latter by North Dakota with 58.3 per cent. of foreign born. Kansas and Missouri are next highest in percentage of native-born white, having 64.9 per cent and 64.4 per cent respectively.

In all, in the 26,000,000 of population in the North Central States, the native-born whites in 1900 were 48.5 per cent, those of foreign-born parentage 21.7 per cent, and actual immigrants 27.5 per cent.

The nationality of the foreign-born or immigrants in 1900 in these North Central States is of especial interest.

TABLE III. Giving nationality of foreign-born or immigrants in North Central States in 1900.

Austria	70,350	Mexico	1,434
Bohemia	118,883 } 222,163	Norway	285,572
Hungary,	32,930	German Poland,	108,469 } 172,076
English Canadian	345,304	Russian "	36,893
French Canadian	77,019	Austrian Poland,	26,714
Denmark	99,845	Sweden	368,869
England	260,369	Switzerland	55,850
France	30,645	Wales	31,737
Germany	1,461,603	Russia	107,529
Holland	77,775	Scotland	72,123
Ireland	34,805	Miscellaneous	82,971
Italy	55,085		

Thus of the total 4,158,474 foreign born, Germany supplied 1,461,603; Sweden, 368.869; English Canadian, 345,304; and French Canadian, 77,019; Norway, 285,572; England, 260,369; Austria, 222,163; Poland, 172,076; and Russia,

107,529; Denmark, Holland, Scotland, etc., supplied less than 100,000 each.

It will be seen that apart from some 300,000 Slavs, this enormous mass of immigrants is made up wholly of Teutonic races, varying, it is true, in language and, to some extent, in customs; but alike in being largely agriculturists, coming from countries where primary education is general, and having a common ethical basis as regards education, religion and progress. Viewed from the standpoint of citizenship, it is found that of the 2,079,811 foreign born of voting age, only one-tenth was not naturalized in 1900, mostly because of their too recent arrival, and but 8.5 per cent were unable to speak English. Of the total illiterates in all the children of the foreign born in the United States but 2 per cent were illiterate as compared with 5.8 per cent of native-born white parents.

But enough has been said to fully illustrate the outcome of the vital energies of such a population as has peopled within fifty years what was an illimitable tract of prairie, inhabited almost wholly by the red man and his source of maintenance, the buffalo. So rapid has been the process, so prosaic the methods, so wanting in the elements which make up the historic hero of chivalry or of the modern novel, that in large degree we fail to grasp the meaning of it all as affecting the work with which this Association has, for the most part, concerned itself. Yet that many millions of men from every country of Europe, from the Eastern States and from Canada could, with no concerted action, no superior guiding hand, no hard-and-fast laws, indeed nothing but individual energy, become a largely homogeneous community, governed by laws marking the most advanced communities as regards social life, moral standards and sanitary regulations, is to me one of the most remarkable of sociological phenomena.

We have at least one means more added to those already utilized of estimating what this means from the public health standpoint in the death rate as given in the census.

The following table is given of deaths in the twelve States, according to the 1900 census:

TABLE IV. Giving deaths in North Central States as per census of 1900.

State	*Population*	*Total Deaths*	*Rate per* 1,000
Ohio	4,157,545	53,362	12.7
Indiana	2,516,462	33,586	13.1
Illinois	4,821,150	61,229	12.7
Michigan	2,420,982	33,572	13.8
Missouri	3,106,605	38,080	13.2
Minnesota	1,751,394	17,105	9.0
Kansas	1,470,495	16,261	10.9
Nebraska	1,066,300	8,264	7.7
N. Dakota	319,146	2,287	7.0
S. Dakota	401,570	3,088	7.6
Wisconsin	2,069,042	24,928	12.1
Average, 10.7 per 1,000.			
United States	75,994,575	1,039,094	13.7

To complete a table for comparison a similar list of deaths from consumption, diphtheria and typhoid, the three types of preventable diseases, may be given:

TABLE V. Showing deaths in North Central States in 1900 from consumption, diphtheria and typhoid.

State	*Consumption*	*Diphtheria*	*Typhoid*
Ohio	5,789	698	1,795
Indiana	4,232	523	1,496
Illinois	6,786	1,504	1,897
Iowa	1,805	255	549
Michigan	2,438	378	680
Missouri	4,107	494	790
Minnesota	1,844	357	386
Kansas	1,414	243	688
Nebraska	592	162	260
N. Dakota	246	120	65
S. Dakota	425	89	73
Wisconsin	2,350	352	365

The tables show that while the deaths per 1,000 for all the United States were 13.7, those for the North Central States were 10.7, to which, perhaps, ought to be added a correction of some 20 per cent. The figures of previous censuses give even lower death rates, so that we may not take these returns as more than indicating a relatively low mortality for all the States of this great area.

When we turn to the census of 1905 we regret to find that

only four of the twelve States are registration States, so that apart from several large cities no mortality comparisons are made. Taking the figures, however, for what they are, it appears that there were 32,022 deaths from consumption, or 1.2 per 1,000; 5,375, or .20 per 1,000, from diphtheria; and 9,044, or .34 per 1,000, from typhoid. Selecting registration cities within these States, given in the 1905 census, it is found the deaths from consumption in increasing order of prevalence were, St. Paul, 1.13; Omaha, 1.13; Detroit, 1.13; Milwaukee, 1.15; Chicago, 1.56; Indianapolis, 1.92; St. Louis, 1.95; Kansas City, 2; Louisville, 2.08, and Cincinnati, 2.30.

Assuming a similar correctness of returns we see very notable differences in the mortality from consumption, the older cities with denser populations, more slums, somewhat greater colored populations having notably higher rates; but it is also true that these States are the more southerly ones with long, hot summers, changeable winter climates and, judged by the higher death rates in diphtheria and typhoid, of a generally lower standard of municipal sanitation. Making every allowance for these several factors it is, nevertheless, distinctly evident that those States with the largest percentage of foreign population of Teutonic immigrants are those which have most notably advanced in population, agriculture and manufacturing industries, as well as in application of public health principles in State and municipal affairs.

The comparison of the average deaths from typhoid in the five years, 1900–05, in registration cities tells the invariable story of a polluted water supply being the measure of typhoid deaths. The order of the cities is, Detroit, .21; Chicago, .29; Minneapolis and Milwaukee, .44; Indianapolis and Kansas City, .48; and Cincinnati, .55 per 1,000.

Very much more of a comparative nature might be added of public health work done, as well as requiring to be done. When, however, we find such a stupendous work as the Chicago Canal carried out to remove the opprobrium of an enormous

and ever-increasing death rate, and the State water surveys being made, it is evident that the States of the North Central Division are continuing to illustrate the quality of their population, in public health work as in matters more immediately commercial. There is no time, and I am not in a position to measure relatively in educational and other social matters this progress; but of what we know of two or three of these States, it will, perhaps, be found that they are leading in these matters almost as much as in the matter I have referred to.

It may be incidentally of some interest to members of the Association outside of Canada to know that since 1891 up to 1906 some 11,678,357 acres have been occupied in the northwest provinces by persons who were foreign-born immigrants, and that they had, in 1906, some 2,307,879 acres in crops. There were in the three provinces, according to the 1906 census, 50,304 families representing 205,774 persons. It may further be of interest to these members, as to us Canadians it is a matter of satisfaction, to learn that of this total 70,703 were farmers from the United States, and were particularly from these North Central States, where we saw so large a number of English Canadians settled between 1880 and 1900, and that these settlers had in crop 964,438 acres of the total 2,307,279 crops belonging to immigrants in 1906. This latter represents some 27 per cent of the total 8,407,697 acres in crop in 1906 in the three provinces of Manitoba, Saskatchewan and Alberta. The rate of development in these provinces may further, perhaps, be understood when it is pointed out that in five years, from June 1, 1901, to June 1, 1906, they received 233,457 foreign immigrants as compared with 298,360 immigrants added during the ten years, 1890–1900, to the population of the twelve North Central States. This was out of a total of 962,587 immigrants to Canada from 1900 to July, 1907. As regards public health development west of the Great Lakes, I shall leave its details to be set forth by officers of the three public health depart-

ments of these prairie provinces. Of their municipal and social advancement I need not do more than ask you to examine for yourselves Winnipeg, the oldest of these cities. But if you wish to go further, then I would say visit Regina, equipped in all which goes to make up a modern city, and which supplies most interesting illustrations of advanced municipal work; while under the shadow of the Canadian Rockies stands Calgary, the oldest of the cities of the "Foothill" province, sunny Alberta, and illustrating what twenty-five years can do to develop the social graces in this health resort climate, famed for its healing effects on consumptives. With legislative machinery and administrative government established in these provinces years before the rush of immigration, it may fairly be asserted that, with a commercial expansion duplicating that of the North Central States, these provinces will prove, at least, the peers in social progress of those sister States whose history I have attempted to summarize.

THE RAT AS A FACTOR IN DISEASE*

By DR. N. K. FOSTER
State Board of Health, California

ABSTRACT

That the rat can and does transmit disease is no idle charge. Living and feasting as they do on the waste of humanity where the disease germs must, of necessity, be found, and ranging through our dwellings and storehouses with this filth upon their feet, no other result could be expected. It is believed that they spread trichinosis, and lately there has been found San Francisco several rats affected with a leprosy-like disease.

Whatever one may believe regarding his rôle as carrier of the ordinary infectious diseases, his accountability in this is but a drop in the bucket when compared with the untold misery and uncounted deaths which are the result of a disease peculiarly his own, — the plague. We may forgive him the disease he accidentally spreads, and the millions of dollars worth of property he yearly destroys, but certainly not his inflicting upon us his own troubles at such a frightful cost. Since he introduced the plague into India in 1896, there have died upwards of six million people, "and the mortality for the week ending April 20, 1907, was as high as 76,000 deaths, practically equal to the British army in India wiped out in a week." This is the cost in lives in one country alone. Others have suffered severely, but no other to this extent.

The money cost is hard to estimate, but in Japan, where a strong and earnest fight is being made to wipe out the disease,

* Read before the American Public Health Association at Winnipeg, August, 1908.

it has been estimated that each death from plague has cost $7,500. In California, where, during the past year, there have been about 170 cases, with a 55 per cent death rate, the cost has been approximately $1,000.000.

There are two propositions that may well be stated here: first, that with plague all over the world and on the advance, eastern North America has grave cause to fear its appearance; second, that plague is a rat disease, and "no rats, no plague." This is so fully proven and universally believed that no time will be taken to discuss it. The conclusion seems clear. *Destroy the rat.* And why not? It will be conceded that he is useless, and that he destroys yearly millions of dollars worth of goods and produce. He has no redeeming qualities and serves no useful purpose, but is wholly mischievous and offensive, nor is it impossible to practically exterminate him. Innumerable individuals have done so from their own premises, and if this effort was extended to all and made country wide he would have to go.

Meantime there is need of active work on the part of the health authorities. Upon us rests a duty which, if properly performed, will save many lives and much expense. The people must be taught the danger from rats, and be prepared for the rodent disease, — plague. The danger of infection from this disease is not so much from the Pacific coast as from South America, where there is extensive infection, and from which rats can, with comparative ease, gain entrance to your cities. While rats are great travelers by water, they do not particularly like to travel on railroad trains, as they find difficulty in getting a supply of water to drink. They are, however, carried in goods that furnish a hiding place, such as furniture covered with burlap, or bananas in sacks. It is not enough to depend upon the very efficient work done by the Public Health and Marine Hospital Service. We must work ourselves and put our cities and towns in such condition that no fear may be entertained of the disease.

There is little to fear from a case of human plague, its presence would be of no great moment, but not so a plague-infected rat. He would soon spread the disease among others of his kind, and a disease will be implanted that will cost much energy, wealth and peace of mind to eradicate. What shall we do?

Every building in a city should be made rat-proof. This seems a big undertaking, and it is, but it is not impossible nor so very expensive for new buildings. The basement should be made of concrete, and the walls closed so the rats cannot get into them. Stables especially should be concreted, and no manure allowed to accumulate unless in tightly covered rat-proof bins. Hay lofts should be made as proof as possible against them, and the hay piled so that cats can circulate among the bales.

All rubbish should be destroyed and not allowed to accumulate, for it is a breeding place for rats. All garbage should be kept in closed metallic cans, and nothing thrown out that a rat can eat. Chicken yards, where rats get such a large share of their food, should be made rat-proof by a sheet iron or wire net fence set fifteen inches into the ground. Cats which are good ratters should be especially bred and given an opportunity to show their value. They are their natural enemy, and if given a chance will destroy them, but it must be remembered that the rat can go where cats cannot and thus escape them. Such places must be destroyed, thus giving the cat a chance.

The destruction of rats by means of spreading among them some infectious disease has not proven a success in California. It has been extensively tried, and while in some instances may have been effective in lessening their number, it has not done what we sincerely hoped it would do. There is still a possibility that in time something may be found at once harmless to other animals as well as man, but destructive to rats. It is certainly something for which to hope.

To be successful in a rat campaign it is necessary to deprive

them of food and breeding place, and our principal efforts must be in that direction. Poison and traps are good as auxiliaries, and should be used, but by cutting off their food and destroying their home much more will be accomplished, and, fortunately, all these things are directly in the line of good sanitation, and will improve the general health of a community.

To accomplish these things requires the united effort of health and general authorities of a city. It is nearly useless for a health department to issue warnings. Stringent laws should be passed and rigidly enforced, and a healthy public sentiment aroused which will not tolerate the existence of vermin around a party's house any more than it does on his person. Every one should be made to feel the disgrace of harboring rats as well as its danger, for pride has a greater hold than fear, and many who would scout the idea of danger would bow to a popular feeling of evasion against a rat-infected house.

YELLOW FEVER IN MEXICO*

By DR. EDUARDO LICEAGA
Federal Board of Health, Mexico City, Mexico

ABSTRACT

Following the custom of previous years, I now come to report to the American Public Health Association on the yellow fever which has been observed in the Mexican Republic from the 5th of October, 1907, up to the day on which I read this report.

As stated in my last report, during the year of 1907 there were not more than five cases observed of this disease, the last one, on the 5th of September, 1907; and consequently, during the last three months of the year, not a single case was observed throughout the Mexican Republic until the 18th of May of this year, when the first case was reported in a small focus which appeared in the port of Laguna del Carmen, on the Gulf of Mexico, belonging to the State of Campeche. We thus find that over nine months elapsed without a single case of yellow fever being observed in our country.

As soon as the Supreme Board of Health heard of the first patient, it sent to the port of Laguna del Carmen one of its most experienced physicians in the struggle against yellow fever, accompanied by a sufficient number of agents to form a brigade, which, like all those operating in the country, occupied itself with the preparation of a list of the immunes and non-immunes in the port, with daily visits to the former in order to isolate any who might show symptoms of fever, whatever might be the cause. These sick persons were kept

* Read before the American Public Health Association at Winnipeg, August, 1908.

isolated until it was clearly ascertained that the disease from which they suffered was not yellow fever. The brigade also made a careful fumigation of the ships anchored in the bay, of the houses which had been occupied by the patients or suspected persons as well as those of all who had come in contact with the sick, in fact, almost throughout the entire block. At the same time other agents attended to the destruction of the larvæ of the mosquitoes in the water tanks or other deposits found in the interior of the dwellings; to the renewal of the water and the closing of the tanks, so that the female mosquitoes would be unable to lay their eggs in them. Steps were taken to clean up the town and to spread oil on all water reservoirs which could not be covered.

This campaign was carried on, not only by the brigade which was sent to Laguna del Carmen by the Supreme Board of Health, but also by the local authorities and even the entire population, whilst the state government gave very efficient aid by orders which rendered the struggle against the disease more rigorous and efficacious.

The result of the campaign has been the extinction of this focus.

An American lady embarked on the river and probably carried the disease with her in a state of incubation to Frontera, which is also a gulf port, in the State of Tabasco, and there the disease broke out. She was promptly and carefully isolated; the same precautions above indicated were adopted and the focus was extinguished in its origin, as from the 4th of July of this year no other case has been observed in Frontera.

Through the carelessness of an employee of the yellow-fever service a case of that disease which appeared in Vera Cruz and had a fatal termination was not reported until the 7th of July, and consequently that case was not isolated in due time. Up to the present date we have been unable to discover the origin of that case. On the 14th another suspected case was reported in the person of a non-immune, and

notice thereof was given, both to the authorities of the country as well as to the sanitary authorities abroad; but once the blood was analyzed it was found to be a case of malaria, and the patient recovered under the corresponding treatment. Notice was then sent to the sanitary authorities of the United States and Cuba that this case should not be reputed as one of yellow fever.

Six other cases then appeared on the 16th and 30th of July, and on the 4th, 7th and 15th inst., with five deaths, making a total of seven cases and five deaths.

The whole of these made their appearance in only one of the four districts into which the city of Vera Cruz is divided for the purposes of the yellow-fever service.

I have thus shown that, up to the date of this paper, thirteen cases and six deaths were reported in Laguna del Carmen, and the focus was suppressed; that in Frontera we had a single case, which was imported from Laguna; and in Vera Cruz, seven cases and five deaths, the last being on the 15th of the present month.

THE RELATION OF STATE OR PROVINCIAL BOARDS TO MUNICIPAL BOARDS AND LOCAL HEALTH OFFICERS*

By CHARLES A. HODGETTS, M.D., L.R.C.P., LONDON
Chief Health Officer of Ontario

ABSTRACT

The relationship of the central state or provincial health authority to subordinate health authorities is one deserving of serious consideration if material progress is to be made, and if concentration of all that relates to public health is to be found in the central authority. Without entering into a lengthy review of their existing status as set forth in the various state and provincial laws, the subject may be dealt with under the following headings: (*a*) Mandatory Powers; (*b*) Advisory Duties.

MANDATORY POWERS. The central health authority should, for the health of the general community, in certain matters possess mandatory powers, and the carrying out of the orders should primarily rest with the local authorities. Upon failure on their part so to do, the power should then rest with the central authority, all costs and charges incident thereto being paid by the parties or municipality affected. Particularly should this be the case in nuisances, the suppression of communicable diseases, and where in all cases upon investigation it is found the local boards have, through indifference or other cause, failed to act.

Such important health matters as public water supplies,

* Read before the American Public Health Association at Winnipeg, August, 1908.

sewerage systems and sewage disposal plants should be under the direct supervision of the central health authority, which should be properly equipped with a staff of sanitary officers as are necessary in such cases. The work should not be divided and given over to independent commissions or boards.

It should also be made impossible for municipalities to initiate, construct or extend either of the above systems or works without the approval of the central health authority, and the issue of debentures and the floating of bonds should be dependent upon this authority's sanction of the scheme and supervision of its construction. Far too often have municipalities been put to undue and unnecessary expenditures in the installation of such schemes, and upon which subsequently they have been called upon to spend still further sums in order to protect, not only the lives of their own citizens, but those of more remote municipalities.

In the larger question of sewerage systems, sewage disposal plants, water work systems and protection and purification of public water supplies it is essential in the interests of the state or province that the initial sanction and subsequent supervision of the same should rest with the central authority. These are health matters affecting so many that they should be placed beyond local authority control, although the responsibility of carrying out of the details of supervision, etc., may properly be placed upon the local health authorities; indeed, where immediate action is necessary, it could hardly be otherwise.

Then, where the local authority, board or official fails to carry out the wishes of the central authority, power should be vested in the latter to do the work or perform the service at the expense of those liable therefor.

ADVISORY DUTIES. As at present constituted, the central Board acts very largely in an advisory capacity to municipalities and local authorities, often directing health

work as applied to the whole province, at least in Ontario, by what are known as Orders-in-Council, which have legal weight for certain definite periods, and frequently advice is given to boards where these minor bodies fail to decide as to a definite line of action. With a reorganized central authority, a large amount of this class of health work would necessarily fall upon the executive health officer and his staff, the advantage being that there would be no delay in consideration of questions as they arose, they being dealt with almost immediately, — an advantage of great importance. With the despatch of such work more time would be given the Board for the consideration of matters requiring some consultation with the chief officer and members of the staff.

In the manner thus briefly outlined has been set forth the relationship which the central authority should bear to all local boards and officers.

STUDY OF DIPHTHERIA OBSERVED IN GUADALAJARA, MEXICO, FROM THE 1st OF JANUARY, 1904, UNTIL JUNE 30, 1908, FROM A HYGIENIC STANDPOINT*

By DR. M. MENDOZA LOPEZ
Mexico City, Mexico

ABSTRACT

In Guadalajara, a city of 102,000 inhabitants, an area of 11 square kilometers, and having an elevation of 1,566 meters above the level of the sea, were registered, according to data found in the archives of the Supreme Board of Health, 641 cases of diphtheria from the 1st of January, 1904, until June 30 of the present year.

This figure is superior to that ordinarily observed, for during this lapse of time an unusually dangerous and general epidemic developed, commencing in June, 1904, increasing rapidly in February, March and April of 1905, and subsiding during August.

Of the 641 cases already cited, 360 belong to this period of fifteen months, and 281 are distributed among the remaining thirty-nine months; which give to these latter months an average of 7 cases a month, a figure which I consider highly abnormal.

While the epidemic lasted, 136 expired; which produces a death rate of 37.77 per cent. The total deaths for the other months were 281; the death rate 46.26 per cent.

The course of the Board of Health with regard to diphtheria has always been the same which it observes when any of the infectious diseases break out.

*Read before the American Public Health Association at Winnipeg, August, 1908.

All physicians, owners or those in charge of inns, hotels, tenements, etc., are compelled by our Sanitary Code to notify the Board of the cases of diphtheria which they observe. If the notification proves to be true, and the patient inhabits a tenement house, hotel, etc., he is immediately sent to the pest-house and the place he has occupied is immediately disinfected; if he occupies a private house and it is possible to isolate the patient he is allowed to remain and the family are supplied with printed directions necessary for the case. When the disease has passed, the process of disinfection is begun. If several cases appear and for this reason it is thought probable that the epidemic form of the disease may develop, the Board is notified or the mayor informed, who in turn orders the agents of the police force to visit daily the tenements, inns or hostelries, etc., and notify at the police stations if they find any person suspected of having the disease, so that he may be examined by an expert.

With regard to the sick who are allowed to be nursed at home, the physician in charge dictates, according to the instructions of the Board, all measures conducive to isolation. Notwithstanding the assiduous care of the Board, and of all the physicians, the distribution of instructive pamphlets, etc., the isolation obtained is defective.

I remember one day being called to visit professionally a certain house; on entering the room where the patient lay, he being a child of three years, I found him in the arms of the mother, and ten or twelve children of different ages lounging and gossiping around the child, frightened by the convulsions it suffered. The child who thus attracted the attention of the others had croup and died a few hours after.

This contact, between the sick and healthy, the uninterrupted relations between the persons caring for the sick and other occupants of the house or inn, should produce contagion and the easy propagation of an epidemic; nevertheless this does not generally follow.

In the tenements there were several persons sick at the

same time; but in the private houses not a single case of contagion was discovered, notwithstanding that in many the healthy children remained in the same houses, and for that reason in contact, at least, with the persons nursing the patient. Of the children who surrounded the little patient, of whom I have just spoken, only one was infected, even though the contact was prolonged for three days and very intimately.

With this I do not wish to state that I do not believe diphtheria to be contagious; unfortunately the proofs of its contagiousness are abundant, and great scientists have succumbed to contagion. This has been perfectly demonstrated; but I affirm that the contagion of diphtheria not only is very inferior to that of measles and smallpox, but also to that of scarlet fever.

TUBERCULOSIS AND POVERTY*

By EUGENE T. LIES

General Secretary Associated Charities of Minneapolis, Minn.

ABSTRACT

The task of the charity worker today is a difficult one. He must analyze, he must synthesize, he must get the story in every case of need. He must consider the man in his relation to himself, to his family, to his neighbors and his neighborhood, to his church, to the industrial situation surrounding him, to the general life of the community. This method it is that is leading to the establishment of certain convictions as to what really the problem of poverty in our modern times is; and no other method could have established these convictions.

Would we do anything to throttle poverty, we must try to throttle tuberculosis. Every case forms a possible center of infection for all who come near, and therefore is a potential creator of additional misery and poverty in the world, the degree of danger depending, of course, upon the degree of skill with which the patient is handled. In every instance is there a long-drawn-out period of illness, together with the inevitable gradual decline in earning ability, and the expenditure of great sums of money for medical service and medicines, and in the case of the workingman, the early exhaustion of his own savings and a drawing upon the savings of his relatives and friends.

With the decrease in the workingman's income comes the deprivation of the necessities of life for the other members

*Read before the American Public Health Association at Winnipeg, August, 1908.

of his family, and with that comes their own lessened power of resistance to the germs emitted by the afflicted one. There usually follows, also, removal from good living quarters to less desirable, and finally to insanitary, dark and small rooms, and these probably in a tenement inhabited by many other families.

If it is the father of the family who dies, the wife possibly has to take employment in order to care for the children; or some of the children who, if the father were living, would have deferred the beginning of their working careers to get more education, must go out as wage earners. In either case the normal family life is disrupted, and possibilities for ill consequences are brought into being. Oftentimes the family is forced permanently upon charity when the children are all too young to work and the mother is needed for their care. Unless the afflicted men are union members, outside charitable aid is, in seventy-five per cent of the cases, needed even during their illness.

If it is the mother who dies the children, of course, lose from their lives the influences which, in most instances, would have aided them to self-supporting, useful careers, and without which the possibilities to the contrary are only too rich, as juvenile court and reform institution records show. If the mother is a widow the situation is so much worse, and the children possibly become public dependants.

Moreover, in the homes of the poor, these children are in constant danger of infection. Indeed, there are many instances on record of the extermination of whole families, and in such, life for years becomes a long, wearisome, dragged-out process of money loss, sorrow and terrible woe.

Probably the worst fact of all in this connection is that the strong hopes of the consumptive for recovery all during the long period of his affliction make him a ready victim of the quack and the patent-medicine man, who take his money ruthlessly and guarantee to cure. All the while the disease is getting a tighter and tighter grip upon him. When his

exchequer is empty the quack casts him off and the charities get him, to bury presently. Oh, that we might discuss here the dark and devious ways of these vipers, the advertising quacks, who prey upon the poor and the unthinking! but this is not the time. Suffice it to say that we know of one instance where one of these scoundrels offered to give a man in an advanced stage of consumption a written guarantee to cure upon payment of $50. The offer was not accepted, and nine hours later the man died in the city hospital. No, we are not living in the dark ages!

Of 67 female tuberculosis cases handled by the nurses of the Minneapolis Associated Charities in 1907, 56, or 83.5 per cent, were housewives, mothers of 160 children. Some of these children have since January 1 become half orphans or orphans, and because nearly all of the cases that come to the nurses are of the advanced, incurable type, Minneapolis will, in the end, have 160 motherless children as a result of these 67 cases.

We have considered, meagerly enough it is true, tuberculosis as a cause of poverty. Let us now consider poverty as a cause of tuberculosis. All authorities agree that this disease is preëminently the affliction of the poor rather than of the rich. And the reasons are not far to seek.

The poor live poorly. They do not have proper nor sufficient food. They live in small, often dark and insanitary rooms, and in tenement buildings that may be crowded. Their income is too small to do better. As a rule ignorance and carelessness go with poverty, and therefore we find that the food that is used is improperly cooked, that dirt abounds, that fresh air is tabooed, that children are woefully neglected and badly fed. The mother in the poor family is usually overworked and breaks down in general health. She has too many children, and that fact in itself intensifies the existing want. All these conditions are direct aids in making candidates for tuberculosis. Add together poverty, ignorance and tuberculosis and you have a bad mess which any com-

munity, out of consideration for its own safety, dare not ignore for long.

Consider that the average workingman has not the say as to conditions in the shop in which he works; that he must accept insanitary conditions, dust, darkness, improper toilet facilities, etc., and you see that he may run right into hotbeds of tuberculosis. If there is a union in his trade, probably it will bring about better conditions; but not all unions even are alive to the needs of their shops along this very line. They require instruction as do the employers.

As to the relation between amount of earnings and tuberculosis, studies have been made in various countries; for example, in Hamburg, Germany, it has been found to be generally true for a number of years that the number of deaths from tuberculosis varies inversely as the income.

Moreover, statistics the world over show that this enemy strikes down its victims in fiendish style just at the period when they should be most useful to their families and to society, and when they should be enjoying the fullest vigor of manhood and womanhood. This period is from 20 to 45 years.

What we need in this country is an adaptation of the German system of industrial insurance which would have the effect, as it has in Germany, of encouraging a man to undertake treatment for tuberculosis early, when he is still in a curable stage, instead of waiting, because of the expense involved, until he goes over the incurable line.

Proper living conditions and proper working conditions aid in the elimination and prevention of poverty. Proper living conditions and proper working conditions aid in the elimination and prevention of tuberculosis. Both poverty and tuberculosis are dependent for development, pretty largely, upon similar causative factors, and each may be either the cause or the effect of the other. *We must fight both at the same time.* While at all times it is absolutely necessary, both in the treatment and prevention of poverty

and of tuberculosis, to lay great stress upon personal factors, hygienic, moral, educational and disciplinary, and this on the double ground of humanity and general welfare, yet authorities the world over agree that both are, to a considerable extent, social diseases, and both call for social remedies.

"Everything that can be done to make men healthier and happier is germane to this purpose of preventing tuberculosis. The improvement of the housing of the working classes and of the sanitary conditions of theaters and churches, as well as of factories and shops; the multiplication of parks and playgrounds, gymnasiums and baths; the widening of streets; the enforcement of a standard of healthful conditions in all occupations; the reduction of the working day; the raising of wages; the education of the women and girls of the tenements in the art of housekeeping and the science of food preparation; the crusade against the noxious features of the saloon; scientific instruction about the effects of alcohol in the public schools, — all these and kindred efforts tend less indirectly than might be thought to reduce the death rate from tuberculosis." (From New York Handbook on Tuberculosis.)

Society today, unlike the people of old, simply dares not, look upon this frightful slaughter from tuberculosis as the will of God. It would be utter blasphemy. We cannot fold our hands in dumb resignation. We cannot escape individual and collective responsibility; but the fight is on, the battle is waging the world over. The question is, are WE in the ranks?

SOME REMARKS UPON THE RESULT OF THE PREVENTIVE TREATMENT OF RABIES AND ITS PRESENT STATE*

By DR. DEMETRIO LOPEZ
Mexico City, Mexico

Translation from Spanish

ABSTRACT

I have the pleasure of presenting to you, at the beginning of this treatise, the percentage of mortality among those who, having been bitten by animals attacked by rabies, have been treated in the Instituto Antirrábico of the City of Mexico.

Twenty years ago this institution was opened (April, 1888), and from that time up to the 30th of last June, 8,680 persons have been submitted to the Pasteur treatment, in only eleven of whom it was not successful; that is to say, the absolute percentage of mortality is 0.13 per cent, a number which, compared with that of the anti-rabic institutions of other countries is one of the smallest.

This percentage has been taken for the whole time that this institute has existed. If we consider only the last six years, from 1902 to 1908, together with the first six months of the present year, the results are more favorable. This period is chosen because during this time almost the same number of persons have been treated as in the fourteen previous years; and because it coincides in a singular manner with the de-

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crease of the failures in the series of treatments with the dried spinal cord.

During this time 4,579 persons received the treatment, and of these only one who suffered from hydrophobia died. So the mortality is reduced to 0.02 per cent.

It is certain that not all the animals suspected of hydrophobia have had it; and there are many cases in which we could not prove the existence of this disease because the dog has been done away with or the persons interested have not hastened to the laboratory, being careless about the animal which caused the wound. Individuals from all the Federal States come to the institution, even countrymen from the most distant places. It was very difficult to make a moderately scientific examination in these cases. It is certain that our countryman is a good judge of whether or not a dog has hydrophobia; but omitting all these cases in which the clinical and experimental investigations fail, and referring simply to the cases proved, the result for 226 cases which compose this group is a mortality of only 0.4 per cent.

THE BEST METHOD OF VACCINATING WITH HUMANIZED LYMPH*

By DR. FRANCISCO DE P. BERNALDEZ

Mexico City, Mexico

ABSTRACT

It is a well-proved and unquestioned fact that the immunity which is acquired against any infection by means of inoculation is increased in intensity in proportion to the amount of vaccine virus introduced into the system, and in proportion to the degree of its virulence, as long as that system can support it without serious injury; so that whatever may be the method adopted in the practice of vaccination, it should be based on those principles which have been established by bacteriological observation and experiment.

The methods adopted by the vaccination department of the Supreme Board of Health of Mexico with the most satisfactory results are as follows: The region in which the vaccine is to be inserted, whether on the arm or on the leg, is carefully washed with sterilized water, soap and a brush, rubbing with the latter until the skin becomes red, and is then dried with sterilized cotton. The inoculation is then practised with lances that have previously been dipped in boiling water or passed through the flame of an alcohol lamp. The pustules of the child from whom the vaccine is drawn are cleansed exclusively with sterilized water and cotton, are very superficially scarified and not used if they bleed. A small quantity is taken up on the lancet and the

*Read before the American Public Health Association at Winnipeg, August, 1908.

inoculation made in the person who is to be vaccinated by means of small punctures, almost joining each other and six to eight in number. In making these punctures the lancet leaves the lymph spread over the place where the punctures have been made. These should not reach beyond the dermic layer of the skin, because that is where the lymphatic net is found abundant and fine, and, moreover, this is the way to prevent the vaccine pustules from bleeding. The object in making the punctures in the form above described is to produce pustules in a series, so that the collection of the lymph will be facilitated, because there will be only one scar and not several; the pustules may be numerous and, lastly, the vaccination is not painful.

The advantages of this method over others that have been described, that is to say, over the scarifications or scratching of the epidermis, or the cauterization with the small Mayer hammer, are that they do not cause any pain, do not give rise to any flow of blood, facilitate the collection of the lymph, and, above all, that they can easily be examined to find whether they present the characteristics of true vaccination, because this is the only way in which the operating physician can ascertain with certainty whether a person has been well or badly vaccinated. If other methods are employed or the skin is scratched, the pustules cannot present those characteristics, and the operator always remains in doubt as to whether the individual has obtained immunity or not.

DISCUSSION

DR. W. F. ELGIN of Glenolden, Pa. Mr. President: I want to confirm one particular feature of the paper by Dr. Bernaldez in reference to the effect of heat on vaccine matter.

Taking virus from the same animal, and subjecting it to various temperatures and noting the results, we found that a temperature exposure of 60° C. killed the vaccine matter in five minutes; at 37° C. (body temperature) it lasts about

three days. Physicians frequently carry vaccine in their pockets that length of time and wonder why it is not active. At a temperature of about 25° C., or ordinary room temperature, it will last a week or more; at a temperature of 15° C. it will last about three to six months; and if you keep it below freezing point, that is, from minus ten to minus fifteen, it will probably remain active indefinitely. I have kept it for four years, and it was good at the end of that time; so that you see, with a range of temperature of from 65° C. to minus 15° C. you have an active virus ranging from five minutes to four years.

I find many health officers and school authorities resort to vaccination of school children in the fall of the year. The demand for vaccine increases rapidly in August and September, so the number of vaccinations among school children varies from 20,000 or 30,000 in June and July to 300,000 in September. As a result vaccine is prepared, carried about, and used in the hot weather, and thus we get a number of failures because of the effect of the heat on the vaccine.

DR. FELL. The plan we followed during the last two winters in smallpox was this: we took the case out as soon as reported, vaccinated all other members of the household immediately; fumigated the premises, and allowed the vaccinated ones to go on about their usual business, keeping them under observation for two weeks subsequently. If a case was found before the third day of the eruption, we were quite sure there would be no more cases from that one, but if the eruption had been out more than three days, then we were equally sure there would be more cases to follow from the original one; and those so exposed were sent to the isolation hospital.

We do not even follow this plan now, or will not in the future. Hereafter, no matter what stage the eruption may be in, we shall remove the case, fumigate, vaccinate all contacts, and keep them under observation. No suspects will

be isolated or houses quarantined only so long as may be necessary to do our work. This method is going to save our cities and towns very large sums of money in handling outbreaks of smallpox in the future.

DR. WILLIAM A. EVANS of Chicago. There is a growth of anti-vaccination sentiment in this country that, I believe, philosophically, is founded on the prevailing principles of American law. In addition to that, it is founded upon a growing diminution in the virulence of the disease. For several years smallpox has been less virulent than it formerly was, and this decrease in the virulency of the disease is a factor in the development of an anti-vaccination sentiment that, to my mind, bodes ill for this country. There is a lot of anti-vaccination argument that we know is false argument, and I believe that the time has come when some organization should prepare a refutation of that argument; and that this refutation should be given the official indorsement of the organization responsible for its preparation. I know of no organization better prepared to do just that work than this Association.

The basic principle of American law is that every man has control over his own body, and that he alone shall decide what shall be done for that body. There is no part of health department work that does not recognize the exploitation of a law that is higher than the ordinary law, and that is the law of emergencies; but when times of emergency are not at hand, judges, bound as they are by precedent and the legal principles underlying their profession, the law, are exceedingly loath to apply the provisions of emergency measures. We in Chicago feel it unduly by reason of the fact that we are a great dumping-ground for a large number of the surrounding States, in which there prevails a great diversity of opinions and legislative procedures on the question of vaccination, and I verily believe that trouble is at hand

unless something shall be done to refute these pseudo arguments of the anti-vaccinationist.

Therefore, Mr. President, I would move that a committee be appointed from this Association to prepare an argument as to the efficacy of vaccination, and that this Association devise some means for the dissemination of that report; and that some effort be made toward a simultaneous and concerted movement throughout this country in opposition to the anti-vaccination movement. (This resolution was referred to the Executive Committee.)

DR. L. LABERGE of Montreal. We have tried to have a compulsory vaccination act in the city, but have not been able to obtain it; but we have an ordinance which throws responsibility on the employer and the superintendent of schools, and with their aid we are enabled to enforce vaccination; and I must say it has been efficacious.

From the first hour of the outbreak of a case we isolate the patient and quarantine the house for fourteen days; and vaccinate the people the first day. We visit every house the first day, and then in three days afterwards, if we find that the vaccination has not taken, we revaccinate. We keep them in quarantine fourteen days in order to be on the side of safety. Unless this is done we are not sure of preventing the spread of the disease. We have some cases in which vaccination does not take, and it may be necessary to vaccinate them three or four times.

If vaccination were a general measure, there is no doubt that quarantine would disappear and would not be necessary. But I hardly think we will succeed in general vaccination.

Laboratory Section.

THE DETERMINATION OF THE TYPHOID BACILLUS IN INFECTED WATER AND MILK*

By D. D. JACKSON AND T. W. MELIA
Mt. Prospect Laboratory, Brooklyn, N. Y.

ABSTRACT†

It is of the greatest importance in tests of the sanitary quality of water and milk supplies that organisms which specifically cause infectious disease through such sources shall be subject to methods of rapid and definite isolation. Up to the present time this has been a matter of great difficulty and uncertainty, owing to the fact that the disease germs which occur in water, and especially in milk, are intermingled with and greatly outnumbered by other intestinal germs and many species of common so-called air and water bacteria.

The method for the isolation of *B. typhosus*, which the authors desire to propose, is to mix varying amounts of the water or milk to be tested with at least four times the amount of sterilized lactose bile solution, and incubate at least twenty-four hours at 37° C.

In routine work this will be the same as the presumptive test for *B. coli*.

If *B. coli* is present in considerable numbers, then *B.*

* Read before the Laboratory Section of the American Public Health Association at Winnipeg, August, 1908.

† Complete Paper in Jour. Infectious Diseases (forthcoming).

typhosus may be tested for by adding one c.c. of the twenty-four to forty-eight hour culture from the bile fermentation tube to 9 c.c. of sterilized water, and making eight successive dilutions of this, each ten times higher than the previous one, plating one c.c. of each of the entire series into Hesse agar, using porous earthenware tops to the petri dishes, and incubating twenty-four hours at 37° C. in an incubator saturated with moisture.

B. typhosus is characteristic on Hesse agar only when the dilution is sufficiently high to produce but few colonies on the plate. It is distinguished from *B. coli* by the formation of colonies of much larger size, often several centimeters in diameter, and consisting of a broad, transparent or scarcely turbid zone between the white center or nucleus and the perfectly circular narrow white seam or edge.

B. paratyphosus. B. pyocyaneus, B. fluorescens liquefaciens and some strains of very highly motile *B. coli* sometimes give a similar appearance. All but para-typhoid do not have the transparent zone. The first and last, unlike *B. typhosus*, produce gas in dextrose broth, and all may be readily separated from the typhoid bacillus by applying the Widal test by hanging drop directly from the Hesse agar or macroscopically in small test tubes from a twenty-four-hour bouillon culture. The dilution should run from 1-50 to at least 1-1000.

PREPARATION OF MEDIA

Lactose bile consists of sterilized, undiluted fresh ox gall (or an eleven per cent solution of dry fresh ox gall) containing *one per cent of peptone* and one per cent of lactose.

Hesse agar is prepared as follows:

Dissolve four and one-half grams of *dry* agar in 500 c.c. of distilled water by heating over a free flame, making up loss in weight by evaporation. Into another vessel pour 500 c.c. of distilled water, and to this add 10 grams of peptone, 5 grams of Liebig's meat extract, and 8.5 grams of

common salt. Heat this until all is dissolved, and make up the loss in weight by evaporation by adding distilled water.

Add the two solutions together; boil thirty minutes; make up loss in weight with distilled water and filter through absorbent cotton held in a funnel by cotton flannel, passing the filtrate through several times until perfectly clear. Test the reaction and adjust, if necessary, to 1 per cent normal acid. Use 10 c.c. of medium in each tube and sterilize for twenty minutes at 120° C. in an autoclave. Cool with running tap water and store in an ice chest which is saturated with moisture.

CONCLUSIONS

Bile is a natural medium for the growth of the typhoid bacillus, and it retards the growth of other bacteria except *B. coli*. When lactose is present in the bile, the *B. coli* causes copious gas formation and soon produces sufficient acidity to retard its own growth, so that the final result is a predominance of *B. typhosus*, which has been multiplying rapidly in the meantime and is not materially affected by this acidity.

When samples of water or milk are inoculated into lactose bile, incubated at 37° C., and then transplanted in varying dilutions into Hesse agar, very characteristic colonies are formed in the high dilutions when the typhoid bacillus is present. These colonies are tested by the Widal reaction.

By means of the method described, we have been able to isolate typhoid cultures from feces with certainty at apparently any stage of the disease. We have isolated it from milk artificially infected with small numbers of *B. typhosus*. We have isolated it from the Grass River used as a source of water supply for Canton, N.Y., from a pond and stream used as a local private water supply at Hastings, N.Y., and from two points in the Hudson River. Every known confirmatory test has been applied to the cultures there isolated, including the Pfeiffer and absorption tests, so that their identity is assured.

At Canton and Hastings it was obtained from bile tubes containing ten cubic centimeters of the water; and in the Hudson River, near Hastings, at the time of the local typhoid fever epidemic at that point, it was obtained in bile tubes containing only one cubic centimeter of the water.

Any volume of water may be tested, provided four times as much lactose bile as water is added to the bottle before incubation. In routine water analysis, when gas is formed in the bile tubes, cultures should be plated out on Hesse media to determine the presence of *B. typhosus*. If characteristic colonies are obtained they should be examined for morphology and motility under the microscope and the Widal test applied. This practically demonstrates their presence, but they should then be isolated in pure culture and plated on the various distinguishing media as confirmative tests.

A METHOD OF DETERMINING THE NUMBER OF DUST PARTICLES IN AIR*

By C.-E. A. WINSLOW

Massachusetts Institute of Technology

ABSTRACT

In many branches of sanitary work, notably in the study of factory conditions, the enumeration of the actual number of dust particles present is quite as important as the determination of the total weight of dust. The following method is a simple one for this purpose. A sample of half a liter or a liter of air is drawn through a two-centimeter layer of granulated sugar (grains .25–1.00 m.m. in diameter), supported in a glass tube of one to two centimeter bore by a perforated stopper, and a square of bolting cloth. The sample should be collected rather rapidly by a suction pump. After sampling, the sugar is dissolved in five or ten c.c. of water, and the dust particles in one cubic centimeter of the resulting suspension are counted in a Sedgwick-Rafter cell by the method used in enumerating microscopical organisms in water. (Whipple, G. C., Microscopy of Drinking Water, New York, 1905.)

Glassware and sugar must be clean, and with all precautions the method cannot be relied on for numbers of dust particles below 100 per c.c.; even with this qualification, however, the method is a delicate one. In some tests of

*Read before the Laboratory Section of the American Public Health Association at Winnipeg, August, 1908.

very dusty air produced by shaking floor dust up in a bottle 13,000–16,000 particles per c.c. corresponds to 3–10 mg. The opportunity for observing the nature of the dust particles is another point in favor of this method, which is suggested as a supplementary procedure rather than as an alternative to the determination of the total weight of dust.

REPORT OF THE COMMITTEE ON TECHNICAL PROGRESS*

ABSTRACT

The report of the Committee on Technical Progress is the report of a committee composed of the chairman of the various technical committees; the chairman of the section being chairman of this committee, *ex-officio*. The object of this report is the correlation and coördination of the various committee reports in order that the whole technical work of the section may be unified.

At last year's meeting but two technical committees existed, the Committee on Standard Methods of Water Analysis and the Committee on Bacterial Milk Analysis.

The Bacterial Milk Committee appointed in 1905 was reorganized in the interim between the 1906 and 1907 meeting and presented its first report to the section last year.

The last report of the Committee on Technical Progress recommended the appointment of Committees on Standard Methods for the various public health services, specifying certain ones.

The Council elected the secretary a committee of one to carry out these recommendations, and his report follows.

A circular letter was sent to every member of the section requesting that he make a first, second and third choice of such committees as he felt the most interest in and on which he could do the best work. From the replies received an eligible list was prepared and submitted to the Council with the idea of selecting from these four members and a chairman for each committee. The first Council ballot resulted in a

* Read before the Laboratory Section of the American Public Health Association at Winnipeg, August, 1908

number of tie votes for both chairman and members, which necessitated the resubmission to the Council of a new ballot.

The second ballot settled all ties, and twelve new section committees were established, as well as the appointment of a member from the Laboratory Section to serve with a member from the Association on a Joint Committee on Mailing Infectious Material.

But three months of the year have been available for the actual work of the committees, and one can readily see that in this limited time little more than organization and a laying out of plans for the coming year could be accomplished.

Practically all section members who indicated their interest in a certain committee have been or will be invited to become advisory members of that committee, and thus all those willing and able to give of their time and strength will find opportunity to turn it to good account. Since, by the terms of their acceptance of committee work, every member is expected to resign if change of position, or other factors, prevent active participation, the prevention of drones on committee seems assured.

We would invite new members and others interested in any of these lines of work to correspond with the secretary, that they be placed either as active or advisory members of these committees.

We would suggest that the committees now in existence be continued with such changes in personnel as the Council may deem wise to make.

It has been said that an organization rapidly decays in the absence of a definite object for its existence. The fact that a large proportion of our membership is now actively engaged in working out problems and standardizing methods for the benefit of this branch of science indicates a live and active organization.

B. R. RICKARDS.
Acting Chairman.

ABSTRACT OF REPORT OF THE COMMITTEE ON STANDARD METHODS FOR THE BACTERIAL DIAGNOSIS OF TYPHOID FEVER*

By F. F. WESBROOK
Chairman

The appointment, somewhat late in the current year, of your committee has precluded the possibility of anything more than a report of progress and the tentative outline of a plan of investigation which seems worthy of trial.

In order to make the laboratory work of the greatest possible value to the executive department of our various boards of health it is wise to plan the best possible articulation of the laboratory work to the discovery of foci of infection and their ecadication. The work of the committee should, therefore, include:

(A) The perfection of standard methods in the determination of the Widal reaction.

(1.) The consideration of the dried blood method, or the use of serum, bearing in mind that many of the laboratories are compelled to operate over a whole State, whereas others limit their work to cities.

(2.) Preparation of outfits for forwarding specimens, the adoption of a standard data blank, and the use of a blank for the clinical history of the case; and, more important yet, the use of a standard blank for epidemiological data. Epidemiological data should be secured at once when the

*Read before the Laboratory Section of the American Public Health Association at Winnipeg, August, 1908.

specimen is gotten. The clinical blank cannot be prepared in full until the disease has run its course.

(3.) Technical methods in the laboratory relating to the preparation of a standard dilution. The use of gravimetric and volumetric methods.

(4.) The adoption of a standard report blank with necessary interpretation on the part of the physician and health officer of the laboratory report.

(5.) A circular to be issued by laboratories containing a description of the method, copies of all the blanks used, and a brief consideration of the value of the method as applied to the diagnosis of typhoid fever.

(B.) Bacterial investigation.

(1.) Feces. (2.) Urine. (3.) Blood.

As yet no method seems available which is practicable for the use of the State Board of Health laboratory, particularly in relation to blood. Various media, methods and devices should be exhaustively tested by the committee, and a report, first of all, on the practicability of the bacterial diagnosis of typhoid made, and if feasible, detailed standard methods reported. Particular attention should be paid to the collection of data on the so-called "typhoid carriers" in various communities in order to determine their practical importance in typhoid epidemiology.

ABSTRACT OF REPORT OF THE COMMITTEE ON STANDARD METHODS FOR THE DIAGNOSIS OF RABIES*

By ANNA W. WILLIAMS
Chairman

The committee presented a statement of existing points requiring further study and a comprehensive plan for the conduct of these investigations.

For the active diagnostic work until a more definite report can be made the committee recommend the following:

WORKING METHOD FOR USE IN THE DIAGNOSIS OF RABIES

1. Removal of central nervous system and of salivary glands under aseptic conditions.

2. Smears or impression slips made from ammon's horn. These are fixed in neutralized methyl alcohol, and are stained over the flame until steamed, with the following solution:

Methylene blue, sat. alc. sol.	30 c.c.
Fuchsin, " " "	5 c.c.
Distilled water	300 c.c.

(To be kept in ice-box until used.)

If typical negri bodies are demonstrated, the diagnosis of rabies may be made. If they are not found, similar slides should be made from the gray matter, (1) of the cerebellum; (2) of the cerebral cortex (motor areas); (3) of the gray matter from other areas. At leat six slides should be made,

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covering a wide area of gray matter, in order to exclude the possibility of localization of definite negri bodies.

If no negri bodies or suspicious forms are found in any of the slides, and the examined material is fresh, the diagnosis is, probably, not rabies. If suspicious forms are found in fresh material the diagnosis is probably rabies. If no definite forms are found in decomposing brains the diagnosis doubtful must be given.

In all cases where the diagnosis is uncertain, animals must be inoculated with a fine emulsion made from material taken from various parts of the brain, and pieces from surrounding parts should be prepared for sections. Pieces should also be taken from the gasserian and several spinal ganglia, for demonstrating the presence of the rabic tubercles as well as of the negri bodies.

Two rabbits or four guinea pigs should be used for the inoculations, which may either be subdural or intracerebral.

Animals should be kept under observation for at least three months before a negative diagnosis is made.

An emulsion from different parts of the brain should be made in sterilized neutral glycerine for later inoculations, if, for any reason, the first should be unsatisfactory.

Decomposed brains should be allowed to remain in the glycerine for one to three weeks before inoculation, unless very weak dilutions are used; in the latter case, negative results would necessitate another inoculation.

In order more thoroughly to test the specificity of the negri bodies and their absolute and comparative worth in rabies diagnosis, the committee suggests that copies of the following scheme, or one similar, for the study of this subject be sent to the directors of the different Pasteur Institutes and laboratories for medical research, which have worked, or expect to work, on rabies, with the request that such institutes undertake studies along lines indicated in the scheme and report their results to the committee.

ABSTRACT OF THE REPORT OF THE COMMITTEE ON STANDARD METHODS FOR THE BACTERIOLOGICAL DIAGNOSIS OF TUBERCULOSIS

The committee presents a tentative report of methods to act as guide until something more complete and better considered can be adopted.

The diagnosis of tuberculosis by bacteriological methods in the laboratory is applicable in four different ways. First, and most important, the examination of sputum. Second, the examination of urine. Third, the examination of pus and other discharges. Fourth, the examination of tissues. These will be considered in the order given:

First. We recommend that laboratories supply outfits for collecting sputum, consisting of a wide-mouthed bottle containing about 30 c.c., with a cork stopper, and suitably packed for mailing. It is better to put 3 to 5 c.c. of five per cent solution of carbolic acid in each bottle. Enclosed with the bottle is a leaflet giving directions for collecting sputum, and blank for the name of the physician sending in the case, the patient's name, date of collection and other data which circumstances in the laboratory render important. The directions for collecting sputum are as follows:

The first sputum raised in the morning is preferred. If this expectoration is scanty, save the entire amount coughed up in twenty-four hours. Be careful to avoid the contents of the stomach, particles of food, etc. Give only what is coughed up from the lung. Be sure that the cork is tightly inserted into the bottle, and that the outside of the bottle is well washed off before packing.

Second. Directions for collecting urine. This should always

be done by a physician or competent nurse. Great care should be taken to wash the meatus thoroughly, and the urine should be drawn with a sterile catheter into a sterile bottle (rubber or glass stopper), with the utmost precautions to avoid contamination, and sent at once to the laboratory. If, from a distance, it should be packed in ice.

Third. Directions for collecting pus. Pus from a freshly opened abscess is to be preferred. If an old sinus exists it should be scraped with a dull curette, and the scrapings be sent with as much pus as possible. Sputum bottles are convenient for the transportation of such material, but the carbolic acid should be washed out with sterile water.

Fourth. Tissues should be sent in sterile gauze, packed in ice.

Examination of sputum. For staining, carbol fuchsin is recommended. For decolorization, a mixture consisting of five parts nitric acid and ninety-five parts of 95 per cent alcohol is the most convenient. Those preferring it may use any of the mineral acids up to 10 per cent, but we advise against very strong solutions of acid. At least ten bacilli should be found before calling any specimen positive. Should the specimen prove negative by this simple examination, it may be digested with two per cent caustic potash solution then centrifugated and the sediment examined.

Pus is to be examined in the same manner.

Urine should be centrifugated, the supernatant fluid poured off, distilled water added, and a second centrifugation done. This is best repeated three times, and the sediment finally examined as for sputum. Special care must be exercised in fixing the sediment, however. If dried slowly, the danger of washing off is largely avoided.

In examinations of all material it may be necessary to resort to animal inoculation. It is especially important in cases of suspected genito-urinary tuberculosis.

In the examination of tissues the method proposed by Mallory and Wright is, perhaps, the best. The routine

differentiation of the tubercle bacillus from the smegma bacillus is best made by the method of Dahms, but animal inoculation should be resorted to in doubtful cases.

The committee recommends that the work of Much and Michelidès, and also of Herman, be repeated; and also that some experiments as to the retention of the staining characteristics of the tubercle bacillus in sputum be examined into.

M. P. RAVENEL,
Chairman.

COMMITTEE ON STANDARD METHODS FOR THE BACTERIAL DIAGNOSIS OF GLANDERS

By W. L. BEEBE
Chairman

The committee presents a statement of questions and answers bringing out points for further study, and reports a place for the continuation of the work.

For active diagnostic work until a more definite report can be made they recommend the following:

Mallein is probably the most reliable diagnostic agent that we have if it is properly applied. A typical reaction is constituted by a rise of temperature of 2.5 to 3 degrees over the highest normal temperature of the previous day, the temperature remaining high usually from twenty-four to forty-eight hours. In addition to the high temperature a painful local swelling at the point of injection and marked depression ought also be present. Occasionally a high temperature without a local swelling, or a local swelling without a temperature reaction is observed, but at this time the committee desires to make no recommendation as to how these animals should be disposed of.

Macroscopical agglutination is considered by many as being as reliable as mallein. It has recently been adopted by the Austrian Government, also by the Prussian army, as the official test. In this country it has a few stanch supporters, while others consider that it is not as reliable as mallein.

Microscopical agglutination has been tried, but is not considered as reliable as macroscopical.

Strauss' method is reliable providing *Bact. mallei* is obtained in pure cultures from the guinea pig. If orchitis fails to appear it is not safe to say that that material from which the inoculation was made did not contain *Bact. mallei*, as occasionally a guinea pig will not develop orchitis, but will eventually die from glanders, and upon post-mortem show the lesions elsewhere. Providing no orchitis is shown the guinea pig ought to be kept two months before it is destroyed.

Usually *Bact. mallei* can be obtained in pure cultures from pus that has been removed from abscesses under aseptic precautions, and occasionally it can be obtained from cultures taken from open ulcers.

The best culture media are potato and acid + 2.5 acid glycerine agar.

Report of Other Standard Methods Committees.

The following committees reported the collection of data indicating the lack of uniformity of methods and some of the reasons for the same, and presented plans for undertaking such experimental work as will be necessary to arrive at facts needed for the formulation of standard methods:

Committee on Standard Methods for the Preparation of Tuberculin and Mallein. Veranus A. Moore, Chairman.

Committee on Standard Methods of Chemical Milk Analysis. James O. Jordan, Chairman.

Committee on Standard Methods for the Laboratory Diagnosis of Syphilis. H. U. Williams, Chairman.

Committee on Standard Methods for the Preparation of Diphtheria Antitoxin. H. D. Pease, Chairman.

REPORT OF THE COMMITTEE ON STANDARD METHODS FOR THE BACTERIAL DIAGNOSIS OF DIPHTHERIA*

ABSTRACT

Organization. The machinery for distributing, collecting and receiving outfits must, necessarily, vary with the conditions, as found in State work, where outfits have to come long distances, and in city work where the distances are short. Hence the question, does harm come from drying during shipment, or from the antiseptic effect of metal (brass etc.) swab wires.

Even small details, such as the most useful test tubes, outfits, mailing cases and the like, are to be considered also the regulation of incubators (with maximum and minimum thermometers), and the making of nutrient serum. In the latter case such points as the usefulness of glycerine should be taken up. Methods of record and report may well be considered here also.

Technical Details. The A, C and D types are usually considered as positive, under any conditions, but the exact weight to be given to the other types, especially in release, is unsettled. The largest and most important part of the work of the committee must be done here. The plan adopted by the committee is as follows:

1. Preparation of large amount of serum and Loeffler's methylene blue to be distributed among the committee members.

2. Adoption of standard incubator temperature and time of incubation.

*Read before the Laboratory Section of the American Public Health Association at Winnipeg, August, 1909.

3. Inoculation by each laboratory on the common culture serum from the serum of positive cases.

4. Preparation and staining of the bacteria grown at standard temperature, and for the selected time with tabulation of results.

5. Interchange of slides and recording of forms.

6. Records sent to the chairman of the committee for comparison, etc.

Thus the only variable factors in the above scheme will be the personal equation and the locality.

Suspicious or Atypical Forms. The status of these forms would be, at least, partially determined in the work outlined above. The Committee suggests the advisability of various laboratories interchanging with other laboratories and studying in detail diphtheria-like organisms isolated from routine and other sources, in particular those organisms which (e. g. Hoag's bacillus X) morphologically are like K. L., but which differ materially in their biochemical reactions. The committee will organize such an exchange system, and act as a clearing house for it. Non-virulent organisms giving the reactions of the diphtheria bacillus also require study.

Virulence Tests. These will be made on a uniform basis agreed upon by the committee.

Optimum Time of Incubation and Symbiosis will be outlined also.

B. R. RICKARDS,
Chairman.

Section on Vital Statistics.

ADDRESS OF THE CHAIRMAN, J. N. HURTY, M.D.

Secretary State Board of Health of Indiana.

To Dr. Cressy L. Wilbur is due quite all of the credit for the organization of this section. That the section was needed, that it has a good work to do, appears upon the surface. The resolution leading to the organization of the section was written by Dr. Wilbur and presented by myself at the meeting in Mexico City in 1906. The question had been informally discussed, and the authorization for organization was passed without dissent. As all here know, the final forming of the section was accomplished at the annual meeting of the Association at Atlantic City in June, 1907. In anticipation of successful consummation, Dr. Wilbur aroused the interest and secured the attendance of a number of earnest workers in vital statistics, and, in addition, arranged an excellent program. Certainly no greater success ever attended a like effort, and this much of history is given, for possibly it may have future usefulness.

THE WORK AHEAD. What shall this section do? A work must be done, something must be accomplished, a structure must be built. The importance of collecting accurate vital statistics and drawing from them the lesson they contain, need hardly be discussed; but it seems not inappropriate to note that the life history of population is of great importance, and that vital statistics comprises the analysis and synthesis of the said life history. For a civilized people to have accurate knowledge of their wealth, to know

the amount and value of the crops of the land, to know fiscal relations and facts, are not of more importance to them than to know about themselves.

Being born is both a serious and a joyous matter; and it is stupid, indeed, for any civilized State not to have accurate records of all births; and, as for records of diseases and deaths, the importance of collecting, tabulating and analyzing them should be understood by even a wayfaring man, though he be a fool. Yet, what has been done in the matter by the free and independent and civilized States of North America?

THE SITUATION. The situation is not discouraging, nor is it flattering. Free schools exist in every State, orderly government prevails, the courts everywhere are pure, literature, art and science flourish, and honor and righteousness control; yet, at this time, only fifteen States comprise the registration area, and their registration is not what it should be for deaths; and as for births registration is woefully deficient. The vital statistics of the National Government, as collected decenially, are a failure, and the method is abandoned. It is, indeed, humiliating to acknowledge that not a State in the Union knows with the accuracy it should know, its birth and death rate. We have fuller and more accurate knowledge of the number of sheep, mules, chickens and hogs, and of the number of deaths caused among them by disease, than we have of ourselves. A great National Bureau, supported by millions of dollars, exists to study and to stay disease among the lower animals and the plants; but the like for the human family has not yet appeared.

As vital statistics are the measure and the compass of hygiene and sanitary science, and as health is the basis of all wealth and power, it seems strange, indeed, that we practical Americans have not long since grasped the situation and acted upon it; however, the indications are favorable. As was shown by Dr. Wilbur in his address at Atlantic City last year, not one of the States having accurate systems of

registration has discontinued since 1904. In 1901 Illinois slid backward, and Iowa in 1904 did likewise by repealing their laws; both, seemingly, not being mentally ready for the bath and the clean clothes.

Other favorable conditions are the excellent work of the American Statistical Association, the action of the American Medical Association, the organization of this section, and the general interest which is certainly rising.

The anti-tuberculosis movement, which is engaging the attention of the public, as well as the interest which is quite everywhere being manifested in public health work, are also encouraging factors; for how is it possible for the people to become interested in public health work, and not finally see clearly the necessity of the State collecting accurate vital statistics? This is possibly the principal reason why the cause of vital statistics has advanced more rapidly in cities than in the States, inasmuch as disease prevention work is more advanced in the centers of population.

A certain class of physicians greatly obstruct the collection of accurate records in Indiana, and possibly, a like class in non-registration States constitute a block to progress. We find in Indiana that this class cannot be induced to take an interest in the work which so greatly concerns the science of medicine, the family and the State. The members are not always ignorant, but generally are. These men require continuous watching to secure from them the data which the law commands they shall supply. But more than this, the educated and strong members of the class tell their patients that State records of deaths, births and diseases constitute an invasion of family privacy. To nullify this pernicious and hateful influence is very difficult. Henry Ward Beecher once said: "The church had many strong enemies within her walls." It may also be truly said that the cause of registration would have advanced further and would have advanced more rapidly, had not opposition existed within the medical profession.

The frequent changes in health boards on account of politics, is another cause of delay. Any and all doctors are hygienists, is the belief of the appointing powers, whose great aim is to advance their individual cause; however, this fault is disappearing, and finally, when health officers enjoy permanence in office and there is reasonable anticipation of the privilege of working in a good and interesting cause, then there will be no lack of understanding nor lack of enthusiasm, as now exists in certain quarters.

THE OUTLOOK. The outlook, I feel sure, is promising. Anyhow, there is no reason for discouragement or impatience. We do not desire revolution, for the results of evolution are more permanent. Time is required for education and evolution, but their results are lasting.

A twinkle of encouragement appears in a recent work undertaken by the International Association for Labor Legislation. This organization is trying to collect data concerning the relation of occupation to cause of death. The data is wanted principally for selfish purposes; but its need brings the importance of vital statistics forcibly to the attention of a class whose help will prove highly valuable. One Indianapolis paper became interested in occupational causes of death on account of the circular letter of the association just named and, upon finding that the State Board of Health could not furnish the data desired because of lack of funds to collect the same, gave a strong editorial upon the importance of vital statistics; and now we are trying to arouse all labor associations, and they are becoming interested and active. It is thus progress is made, and I have no doubt we will be able at the next session of our legislature to secure a better appropriation for statistical work.

The Indiana Board of Health began January 1, 1908, to collect birth records. Our law is not all it should be, but it is capable of doing passable work; its greatest defect being a clause allowing twenty days in which to report. And

this clause was insisted upon by a medical member of the legislature at the time the law was passed. Had we had laymen only to deal with the defect would not exist. In the first month of our work the number of births collected checked fairly with our calculations as to what the birth rate should be, and very soon two difficulties in the way of accuracy appeared. The first was the old difficulty met with in collecting death records, namely, the doctors. The second was the lack of understanding and interest of parents. As to the delinquent doctors, I fear it will be more difficult to educate them and secure their coöperation than it will be to secure the attention and coöperation of the laity. In the first six months of this year we sent the following letter to every mother whose child was not named in the certificate:

"We have received at this office for legal record the birth certificate of your baby. Please fill out the inclosed blank where child's name is called for and return to us in the stamped and addressed envelope, and please correct any errors, either of dates or spelling of the names.

"This legal record of the birth and name of your child is of great importance to you, to your child and to the State. The record is frequently needed by those who least expect it. Some day it may be required in court to prove your child's parentage, or to prove inheritance of property, or to prove right to insurance or pension, or to prove legitimacy. Every mother should demand that her child's birth be legally recorded as the law commands; and also demand that the physician or midwife carefully look after the matter, for their duties are not fulfilled and they should not be paid for their services until they make the report required by law. Women will do wisely to discuss with each other the importance to themselves and to their children of legal records of births and deaths.

"If at any time the State Board of Health can help you, please write to us. Thanking you for your kind reply, and wishing you all happiness, etc."

Despite the requirement that omitted names should be supplied on supplemental blanks by the physicians or midwives attending the births, still every month we had over 2,000 birth certificates without names. Our letter to mothers usually brought the names, but for lack of funds we have been compelled to discontinue the plans, and now our collection of births languishes. Our letter also served the purpose of educating the people in the importance of collecting vital statistics, and certainly had a good effect, as is proven by letters from the people in response. Our regret at being compelled to stop the good work on account of lack of funds is, of course, considerable; but that defect will be remedied in another year if the M.D. members of the legislature do not too strongly oppose.

Perhaps the most important work before us is the adoption of rules of statistical practice. This will, doubtless, be done with wisdom, and then comes the practical working of them, a matter which will be attended with difficulties; but no difficulties shall be allowed to discourage.

There must be full consideration of rules. We must do our work well and thoroughly. First, comes statistical definitions of deaths, stillbirths and births. Second, requirements of registration of deaths and births. Third, methods of testing accuracy. Fourth, adoption of uniform age periods in death statistics. Fifth, statement of cause of death. Sixth, occupation. Seventh, the adoption of standard tables and uniform methods of analysis.

ACTION. We now are in action. Not until the last year, marked by the organization of this section, has anything been done with vital statistics in this association but talk. We shall now proceed with intelligent and persistent energy. Mere talk about the importance of vital statistics shall cease. When Demosthenes was asked the first element of successful oratory he said, "Action." When asked the

second he again said, "Action"; and the third and all other reqirements were stated to be "Action."

The Section on Vital Statistics of the American Health Association is now in action. Let the battle proceed.

THE MORTALITY FROM INDUSTRIAL DISEASES*

By L. W. HUTCHCROFT

Statistician for the Wisconsin State Bureau of Vital Statistics

The subject of occupational diseases, their extent, cause and methods of prevention, has not received the attention that it should in the United States. This is partly accounted for by the lack of a uniform system of vital statistics whereby the causes of mortality for the country, as a whole, can be compiled and the relation of occupation to cause of death ascertained. Another factor which, until recently, has made it impossible to obtain the facts necessary for a proper understanding of the subject, is the "*laissez faire*" policy of the various States in regulating conditions of employment.

In attempting to summarize what has been done in the various States to investigate the extent, nature and cause of occupational diseases, we must keep clearly in mind that, with the exception of two or three investigations which have been made of certain isolated industries, practically nothing has been done. A large part of the available material has been given us by attempts to investigate the unhealthful environment of certain industries, and not with the prime object of ascertaining what diseases are prevalent in any given industry.

It is to be regretted that no serious attempt has ever been made to do research work in this country along the line of occupational diseases. The many foreign reports which are constantly being quoted whenever the subject is discussed,

* Read before the Section on Vital Statistics of the American Public Health Association at Winnipeg, August, 1908.

are not sufficient for an intelligent understanding of the subject in a country where the habits and temperaments of the working men and conditions of employment are so radically different. At any event, the subject is of sufficient importance to warrant a thorough and impartial investigation of home industries, both by the State and through private organizations. The most that can be done at this time is to point out the necessity for action and suggest methods for obtaining the desired facts.

The conditions under which labor is performed, especially factory labor, is now a subject of much concern and, as a result, most progressive States have passed general laws which are designed to improve the hygienic conditions of factories and workshops; however, a large part of our factory legislation is based upon the filth theory of disease, and never will accomplish anything to protect the laborer from dangerous dusts, gases or materials, unless revised. The statutes which we now have in several States requiring the use of protective devices, and providing more sanitary environment for the laborer, have come about from an investigation of conditions as they exist rather than from a study of the results in disease and mortality from any given occupation. Such laws are general in their character, and were passed to meet a popular demand for some sort of regulation. They do not protect the wage earner from the dangers to which he is exposed in some industries, even though some one in authority is clothed with the power to prohibit employment in "dangerous trades" until the dangers have been removed.

Indisputable evidence must be presented to show what trades are dangerous to health, and then specific statutes containing a penalty clause for violation should be enacted to meet the exigencies of the case. Such laws should be enforceable under the police powers of the State, as they are in Belgium.

The great similarity of legislation in the various States is sufficient proof that little, if any, original work has been

done in any State to meet conditions quite dissimilar to those in other parts of the country. Too much attention has been paid to purely industrial and economic problems and not enough to the importance of the health and well-being of our people. A healthy people is the most valuable asset to the State, and is less carefully guarded than any other.

The most valuable work that the State can do, and, in fact, the only part it should take in eradicating disease, is to insist upon the adoption of preventive measures. If the cigar factories are unsanitary and improperly constructed, it is the proper business of the State to see that all agents dangerous to health are removed, rather than to provide curative treatment for those who have contracted a disease as a result of employment in an unhealthful factory. The factory development of the country is yet in its infancy, and if we would protect the vast army of laborers of the future something must be done to point out the unhealthful occupations and provide adequate protection for the people who find it necessary to follow any given trade.

Excluding the element of cleanliness, which has been emphasized at the expense of a more careful study of diseases incident to occupation, the laborer is entitled to pure air, moderately heated. When this can be obtained, unhealthful influences, such as dust and noxious gases incident to occupation, will be reduced to a minimum. The question of ventilation, heating and lighting is not given sufficient consideration and, as a result, the factory is usually constructed to meet the mechanical requirements of the industry as they have come to be understood, without regard for the health of the workmen, except, possibly, the few employed in the business office.

Strange as it may seem, the laborer will not protect himself, even though the means for protection are provided. In order to accomplish something for the protection of workingmen whose health is constantly endangered by occupation, there is an urgent need, if not a demand, for more sanitary

administration and better protective devices. It is the duty of the State to prohibit, under the penalty of a fine or imprisonment, the carrying on of a trade in such a manner as to produce disease and death.

The machinery necessary to make original investigations and collect data for the guidance of legislation, should preferably be provided as a part of the State health organization; however, with but few exceptions, the State boards of health are not provided with the necessary funds to do satisfactory work in the most important of all branches of preventive medicine; namely, the hygiene of employment.

Most State health departments are clothed with ample authority to provide for labor, clean floors and walls, proper ventilation, light and sanitary drains. They cannot, however, determine that a certain occupation is dangerous to health or causes certain diseases without data, showing an excessive death rate among employees in the industry. Reliable statistics have not been compiled, and until we have some data showing the relation of occupation to certain diseases, public interest cannot be aroused.

The condition of woman, on account of her small wage and susceptability to disease, when compelled to labor in unsanitary shops cannot be too strongly emphasized. Certainly there is an urgent demand for better statistics showing the exten to which woman has entered the gainful occupations and the effect of the employment upon her health. Statistics taken from foreign reports show conclusively that, under certain conditions, the employment of women, where any lead products are manufactured or handled, should be absolutely prohibited. From the standpoint of the individual, this is necessary in order to preserve health and, as a matter of public policy on the part of the State, there is a still greater demand for legislation along this line.

The effect of inhaling large quantities of apparently harmless dust, such as coal dust, has never been definitely determined. In some foreign countries, where the question is

being investigated, a form of sarcoma, or tumor, has been attributed to this cause. The hook-worm disease, prevalent among miners in the Southern States, is also a fruitful subject for investigation. Germany has distributed throughout the empire pamphlets setting forth the nature of the disease and approved methods of prevention.

The relation of inhaling dust-laden air to pneumonia is an open question, but there is indisputable evidence that the irritation set up in the lungs by the introduction of certain forms of dust presents a very fertile field for the pneumonia cocci. On account of the micro-organisms contained in the material which workmen are often required to handle, wool, hair and hide workers, rag pickers, rope makers, button makers, etc., are in great danger of contracting anthrax, glanders, conjunctivitis and malignant pustular diseases, unless care is exercised.

As proof of the unhealthfulness of certain occupations in England, Dr. Ogle has found that the general death rate in England among men from twenty-five to forty-five years of age is 10.1 per thousand; while for typesetters the rate is 11.1; for chimney sweeps, 13.7; brewers, 13.9; file cutters, 15.3; and inn keepers and servants, 18 per thousand.

Considering the mortality among clergymen as 100, Dr. Ogle has also compiled the following table showing the comparative death rates for various occupations:

Gardeners	108	Bookbinders	210
Agricultural laborers	126	Quarrymen	202
Fishermen	143	Leadworkers, painters, glazers	216
Carpenters	148	Cutlers	235
Shoemakers	166	Coachmen	267
Bakers and millers	172	Brewers	245
Masons	174	File cutters	300
Cabinetmakers	173	Potters	313
Workers in wool man'res	186	Inn servants	397
Workers in cotton man'res	196		
Printers	193		

At the Munich Polyclinic in Germany, where 1,425 cases of tuberculosis were treated, 30 per cent of the patients

had been exposed to metallic dust; 18 per cent to mineral dust; 26 per cent to vegetable dust; 17 per cent to mixed dust; and 8 per cent to animal dust. The Munich authorities have also made an extended investigation of the relation of tuberculosis to stone workers, and have found that 40 per cent of the mill stone workers were tubercular.

The industrial experience of the Prudential Insurance Company from 1897 to 1905, as compiled by Mr. F. L. Hoffman, gives some valuable side lights on the relation of occupation to tuberculosis. This is one of the most valuable contributions to the subject of industrial diseases, and it is to be regretted that the data are, of necessity, too incomplete to formulate general statements for each industry. The following extract is taken from the tables prepared by Mr. Hoffman:

Occupation	Total Deaths	Deaths from Pulmonary Tuberculosis	Per Cent of Deaths from Tuberculosis To Total Dths	Per Cent of Deaths from Tuberculosis At Ages 25-34	Per Cent of Deaths from Tuberculosis At Ages 35-44
Steel grinders,	117	60	52.1	72.7	62.9
Metal polishers,	255	98	40.4	55.7	44.3
Tool makers,	264	89	24.8	57.4	37.1
Engravers,	164	61	38.4	61.	47.5
Stone workers,	763	274	36.7	52.4	48.4
Potters,	346	110	33.	54.7	40.8
Glass workers,	716	213	30.8	49.7	32.3
Glass blowers,	251	76	30.3	57.7	25.
Printers,	1,384	527	39.3	55.4	39.1
Compositors,	147	53	36.1	66.7	39.3
Pressmen,	178	81	45.5	50.	53.1
Hatters,	750	248	34.4	54.2	46.
Cigar makers,	1,349	389	29.8	54.3	43.6
Spinners,	167	50	31.1	54.5	44.1
Weavers,	818	228	28.8	55.4	39.3

The following table published by Mr. Nodler in the Minnesota *Journal* for Oct. 1, 1905, shows the ratio of deaths in eighteen other trades to deaths among farmers:

Farmers	602	Cotton mills	1,141
File workers	1,810	Printers	1,096
Lead workers	1,783	Coopers	1,083
Potters	1,702	Brick and stone	1,001
Cutlers	1,516	Wool	994
Glass blowers	1,487	Tin	991
Copper workers	1,381	Carpet weavers	973
Iron and steel	1,301	Bakers	920
Zinc	1,198	Blacksmiths	914
Stone quarries	1,176		

Care must be exercised in distinguishing between the influence of occupation and the habits of the workers when an unusually high death rate is found for any given industry. It would, therefore, be extremely valuable to require the medical part of the death certificate to show the relation of the occupation to the cause of death. Such information, however, if correctly stated, would necessitate careful investigation on the part of the person required to answer the question and, on account of a lack of knowledge regarding the exact relation of occupation to disease, the question would probably be unanswered. Again, the physician will often be reluctant about expressing as a fact for public record what is only a matter of personal opinion. One of our greatest difficulties, at the present time, is to induce physicians to fill out the medical certificate of the cause of death so that the sequence of diseases, provided there is a complication, can be shown.

A much better plan, and one which will give valuable data for study in other lines, is to obtain what might be called an "occupational history." Instead of merely asking for the occupation of the deceased, the present occupation, if any, with its duration, and former occupation, with the duration of each in years, should be obtained. On the standard death certificate these items will be obtained as a part of the "personal and statistical" particulars and are, therefore, easily acquired, since this part of the death certificate is, in most cases, filled out by a near relative, or some one intimately associated with the deceased.

For the purpose of getting the facts whereby a proper study of occupational diseases can be made, this method, or a similar one, has another advantage which should be carefully considered, namely, the information can be obtained in every State now using the standard death certificate without any change in existing laws.

The vital importance of stating the occupation in definite terms cannot be too strongly emphasized. Any attempt

to classify our mortality statistics by occupations shows an unusually large class of decedents, whose only occupation is given as "laborer" or "domestic servant." Such a statement is quite valueless as a statistical record, and should not be accepted by registration authorities when more definite information can be obtained.

On account of a lack of uniformity and completeness among the various States, and by the Federal Census Bureau in collecting statistics of occupation, it is impossible to determine true death rates for any considerable number of occupations. We can, however, obtain comparatively accurate estimates of mortality rates by industries. A comparison of these rates, with the death rate for the entire male or female population in a given age group, will reveal, at a glance, the industries in which there is an abnormal death rate. The diseases peculiar to each industry can also be determined from the mortality reports. Where the industry is centralized there should be little difficulty in determining what destructive agencies are at work. Dr. Gilbert states that every disease recognized as particularly frequent in a profession ought to be considered as an industrial disease to the extent that it is clearly due to the risk in the trade.

It is very evident, from the division of labor which has come about in most of our industries, that the work done by one set of laborers in an industry might be very unhealthful and cause some special form of occupational disease, while the employees in the remainder of the industry might not be subject to any destructive agencies. It is the particular branch of the industry which develops an occupational disease with which we are concerned, although for purposes of comparison it would seem desirable to study the industry as a whole. Dr. W. A. King states that the general distinction of what a person does and the conditions surrounding his employment is of most importance in a study of mortality based on occupation.

THE NEED OF GREATER UNIFORMITY AND ACCURACY IN STATISTICAL EXPRESSION.*

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In the physical sciences it is necessary that the various observers and experimenters employ exact and comparable methods and instruments in measuring the bulk, temperature, weight, etc., of gases, liquids and solids. In the same manner accuracy and uniformity of standards is necessary in such instruments as are employed to measure time, motion and space. The social sciences are less exact than the so-called physical sciences, in part because the subjects with which the former deal are not so amenable to rod and rule as those embraced in the latter. There must, in the nature of things, always be a difference in exactness between the solution of such problems as calculating the time of the return of a comet, or the location of a ship at sea, and the calculation of the divorce or suicide rates of a given population. Because it is not possible to be as exact in the social sciences as in the natural or physical sciences, it is all the more important that observers and workers in the former field exercise every precaution to be as accurate in their measurements of social phenomena as possible. Otherwise, the efforts to deduce conclusions, as to the present or future, from the observation of past experience, will be likely to prove misleading rather than trustworthy.

*Read before the Section of Vital Statistics of the American Public Health Association at Winnipeg, August, 1908.

Without going very far into the subject here suggested, I wish to direct attention to one or two common errors which are met with in official reports and other supposedly reliable sources, where accurate statements are expected, and where needlessly inaccurate statements would appear to be inexcusable. The expression "per cent per thousand" is one quite frequently met with in official reports on mortality and sickness, and in otherwise carefully edited periodicals and newspapers. The phrase is, of course, meaningless, for per cent, or per centum, signifies by the hundred, or parts of a hundred. Many illustrations of this loose and meaningless phrase could be brought forward but a few will suffice for my purpose. One of the most carefully edited of our American newspapers has editorially stated that, "according to the most authoritative of recent statistics of suicide, the country in civilization where the rate per thousand living is greatest is Saxony, with 31.1 per cent, while in the United States it is only 3.5 per cent." The rates quoted were, as a matter of fact, rates per hundred thousand of population. Again, the same newspaper printed a Washington despatch referring to army losses in Cuba in which the following phrase was used: "The percentage of loss was 1.25 per thousand." In a recent otherwise carefully prepared and comprehensive publication of the Carnegie Institution I find the phrase "per cent per thousand." In an official report of Western Australia I find the following statement referring to the fatal accident rate of men employed in mines: "As compared with that of the previous year the death rate of 2.52 per cent per thousand men employed at all mines has slightly decreased." Again, in the last issue of an official report of Buenos Ayres, I find the following table heading: "Total deaths in the city, from several diseases of the last twenty years, for each 10,000 inhabitants, showing percentages of each disease." As a matter of fact, the table gives rates per 10,000 of population, no more and no less.

One other point, also, is deserving of careful and critical

consideration by those who are responsible for the compilation of vital statistics and the calculation of death rates. Is it necessary or advisable to express the death rates from specific causes of death in terms of 100,000 of population? It seems to me that a more proper, because more convenient and just as accurate, basis would be 10,000 of population. The U. S. Census office uses the 100,000 basis, but it seems to me that it is only a degree better than the 1,000,000 basis used by the Registrar-General of England. What are wanted are conveniently-comparable rates, and if there is one integer in practically all of the rates that is entirely sufficient. On the 10,000 basis all of the principal causes of death would show rates with at least one integer and, if necessary, the rates could be carried to two places for causes yielding comparatively few deaths, such as alcoholism, homicide, etc.

As the matter now stands there is no uniformity. Some reports give death rates from specific causes per 1,000,000 population; some per 100,000; and some per 10,000. After long and varied experience in the use of death rates, my decided preference is for death rates per 1,000 of population when all causes in the aggregate, and all causes by specific age periods are concerned; the basis to be 10,000 of population when the death rates are calculated for specific causes of death.

In this connection I wish to call attention to what I consider a convenient and altogether admirable short-cut expression for the phrase per 1,000. The expression 0/00 is in quite general use in foreign statistical publications and it seems to me to be an admirable one to employ where brevity is desirable, particularly in table headings. If death rates were never calculated on a basis beyond 10,000 population, the signs 0/0, 0/00, and 0/000 could be very conveniently employed to express *per cent*, *per thousand*, and *per ten thousand*, respectively; and this, it seems to me, is another strong argument in favor of death rates per ten thousand where specific causes of death are involved.

There is great need of an early organized effort to secure uniformity of practice, both in the form of expression of statistical statements and in the mathematical expression of statistical facts.

NOTIFICATION AND MORBILITY RETURNS IN CUBA WITH SPECIAL REFERENCE TO YELLOW FEVER AND OTHER MAJOR INFECTIOUS DISEASES

By CARLOS J. FINLEY, M.D.
Chief of the National Sanitary Department of the Republic

Obligatory notification of cases of yellow fever was an unprecedented innovation in the island of Cuba when orders to that effect were issued for the first time in this country, in 1899, by the U. S. Military Government after the war with Spain. The generality of physicians, as well as the rest of the population, held the belief that yellow fever was caused by miasmatic emanations, or by special atmospheric conditions, and being persuaded that the disease was in no wise contagious, the exaction of the aforesaid notification was considered as a superfluous measure without adequate justification. Knowing this, it had been no matter of surprise, either to myself or to my diligent collaborator, Dr. Claudio Delgado, that so little attention had been paid to the persistent arguments and frequent presentation of new facts in support of our personal conviction that the only means by which yellow fever could be transmitted from man to man was through the bites of mosquitoes of the Stegomyia species that had previously bitten yellow fever patients.

Even after the admirable confirmation of this hypothesis by Major Reed's Havana Yellow Fever Commission, as proclaimed at the meeting of the Pan-American Congress held in this city, February, 1901, the new doctrine counted but

few adherents; but their number was materially increased after Major W. C. Gorgas' splendid archievement of completely stamping out the disease, in the space of seven months, by measures exclusively based on the findings of that commission.

The most important additions made by Reed's Havana Yellow Fever Commission to my own hypothesis, had been their demonstration of a definite incubation period for the yellow fever germ, both in its mosquito host and in the human host, and the fact that the yellow fever patient is infectious for the mosquito only during the first four days of his attack, and not during the first six days as I had assumed. The knowledge of these facts now made it all the more imperious that the occurrence of every new case should be promptly notified in order to curtail the infection of mosquitos, and Major Gorgas' wonderful success in 1901 was only made possible by his sagacious combination of a more strict enforcement of prompt notification of all new cases of suspects, together with a very active campaign, undertaken at the most favorable season, for the destruction of all breeding places for the yellow fever mosquito. Under the conditions, which at that time prevailed in the Island (difficult overland travel, absence of great central sugar estates such as have subsequently been established, and comparatively small proportions of non-immune Spanish laborers), under these conditions, I say, the immunization of the districts under the immediate control of Major W. C. Gorgas constituted an effective safeguard for the rest of the Island.

With patients belonging to the higher classes any delay in notifying a new case may, as a rule, be attributed to neglect on the part of the attending physician, but it is otherwise with the poor, analphabetic laborers who grudge every cent of money spent for obtaining medical advice, and only consult a physician as a last resource. Fortunately, however, in Havana and in most towns of some importance in different

parts of the Island, there are special private hospitals, *Quintas de Salud*, where, by contributing a monthly quota of one and a half dollars, the subscribers are entitled to admission and treatment without any additional expense, and most of the non-immune immigrants avail themselves of these advantageous conditions. The number of subscribers to those *quintas* in Havana alone amounts to over 60,000, and with this large income those *quintas* are able to keep their establishements in good shape and, as a rule, they have readily complied with the requirements of the sanitary department. The directors of these hospitals are responsible for the prompt notification of all suspects, and any omission to do so would be discovered by our inspectors who visit those hospitals daily.

Every case at all suspicious has always been carefully investigated by competent experts, not only regarding the diagnosis, but also as to its probable origin and places visited by the patient during the first days of his attack.

As a rule, whenever a first case or group of cases, has been recognized and tracked before the expiration of the mosquito-incubation period, that is, within the first week after the invasion, it has been possible to control the spread of the disease by the usual prophylactic measures, which include effective fumigation of the patient's dwelling, as well as of the places where he is likely to have become infected and those which he may himself have infected; careful vigilance over all non-immunes within the infected zone, and special attention to the removal of all breeding places for mosquitoes within the infected area.

It was owing to the lack of information regarding the first two cases which occurred in Havana in October, 1905, that the disease obtained once more a foothold on the Island. The cause of death in those two cases had been wrongly attributed to nephritis and to *icterus gravis*, respectively. But this was only recognized a fortnight after the first invasion; moreover, the original focus (a very unusual one) was

only suspected after the second week of November. This focus was, in all probability, the passenger's landing station on the Havana wharf. The first clue which led to its discovery was the fact that among the first eleven cases that had been recorded in Havana three had been attacked on the third, fourth and fifth day of their landing. These three persons had proceeded from New York or from other non-infected ports of the North; they had each come on separate non-infected vessels, and had taken their quarters in different houses or hotels, where no previous cases had occurred. The landing station was then thoroughly fumigated and the operation again periodically repeated till the end of the epidemic; and in the next two and a half years, during which yellow fever cases have occurred on this Island, never again has another invasion been recorded so closely following after the arrival of the person on these shores.

The three successive epidemic outbreaks of yellow fever corresponding to the years 1905, 1906, 1907 and 1908, when the epidemic may be considered to have been finally extinguished, have produced the following number of cases and deaths:

	Cases	Deaths
1905, October to December 31	77	24
1906, January to December 31	112	33
1907, January to December 31	168	56
1908, January to August 18	43	9

Smallpox, the extinction of which had been the foremost preoccupation of the U. S. Military Government since January, 1899, had been finally stamped out completely under Major W. C. Gorgas' sanitary administration in 1900; and since the inauguration of the Cuban Sanitary Department the whole territory of the republic has continued free from the disease, notwithstanding the introduction of imported cases on several occasions, and the occurrence of two secondary cases which developed in consequence of wanton exposure, while two of the imported ones were being treated at Las Animas Hospital. The spread of the disease was, however,

effectually prevented by isolation of the patients, and prompt vaccination of all non-immunes within a wide area in that quarter of the city.

Regarding all other diseases, with the exception of a brief epidemic outbreak of scarlet fever in the district of Havana, from September, 1903, to the end of January, 1904, the whole territory of the Republic of Cuba has remained free from any epidemic up to the present date. The rise and fall of the monthly mortality, having oscillated as usual, tuberculosis being the most important factor during the cooler months, while enteritis, under two years of age, takes the lead during the summer season, except in the district of Havana, where means are provided for obtaining a more satisfactory milk supply.

According to our sanitary ordinances, the diseases for which notification is required, are the following (classed simply in Spanish alphabetic order):

Beriberi, Colera asiatico, Dengue (in non-immunes to yellow fever), Diphtheria, Epidemic Dysentery, Escarlatina (Scarlet fever), Fiebre amarilla (Yellow fever), Fiebre tifoidea (Typhoid), Ictero grave (in non-immunes to yellow fever), Lepra, Meningitis cerebro espinal epidemia, Muermo y farcino (Glanders), Peste bubónica, Rabia (Rabies), Sarampión (Measles), Tetanos en recien nacidos (Neonatorum), Tifus exantomatico, Tuberculosis pulmonar é intestinal, Viruela (Smallpox).

Strict compliance with this order is, however, only enforced at all times for the major infectious diseases and, under special circumstances, for such of the minor diseases which might serve as an excuse for not reporting some of the major ones which threaten to assume epidemic form.

Municipal Health Officers' Section.

PROTECTION OF PUBLIC MILK SUPPLIES FROM SPECIMENS CONTAMINATED WITH PUS ORGANISMS

By JAMES O. JORDAN

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An important and frequently neglected factor in procuring a clean milk supply is the elimination of specimens contaminated with pus organisms. Although these samples indicative of udder complications, cannot all be excluded, a persistent effort should be inaugurated in the attempt to reduce their number to a minimum. With milk supplies of large cities the only practical method for municipal health officers appears to be microscopic examinations of specimens, and where streptococci or excess of pus are indicated prohibiting the sale of milk from the faulty sources, until such time as the conditions become normal.

It is not the province of this paper to deal with the methods which are to be employed in determining the extent of infection by pyogenic organisms; but while good methods are essential, likewise correct interpretation of results, little progress can be made if too much time is devoted to the leucocyte pus controversy, or to the significance to be attached to the finding of streptococci, either in limited or large amounts. The practical and necessary problem is not argument, but

that of exclusion of milk from unhealthy animals. A system which has brought satisfactory results is that adopted in Boston in 1905. Beginning at that time, samples were collected almost daily, and subsequently examined at the Bacteriological Laboratory, under direction of Mr. B. R. Rickards. The findings, when completed, were reported to the Bureau of Milk Inspection, by which office the collections were also made. Samples containing streptococci and all those reported as contaminated with pus, namely, those having fifty or more pus cells to the one-twelfth immersion field, *i.e.*, about 500,000 pus cells to a cubic centimeter, were deemed actionable, and where the milk was from a definite source, future supplies from that quarter were excluded until the milk became normal. Where the objectionable sample was of mixed milk an effort was made to discover and eliminate the faulty dairy.

While this policy was at first viewed by dealers with disfavor, there is, at the present time, less opposition to the exclusion of infected milk than has been hitherto evidenced over this prohibitive mandate. That the above course has brought about a lessening in the number of these objectionable specimens can be demonstrated by the following figures:

Year	*Number of Samples Examined*	*Per Cent of Infected Samples*
1905	5.559	10.48
1906	5.007	4.90
1907	4.609	1.10

Since beginning the exclusion of infected milk the contracting or wholesale firms have established bacteriological laboratories for examining their own supplies. Their aid in the detection and debarment of abnormal specimens has been a potent factor in reducing the number of undesirable samples. In 1906, of 27,000 bacteriologic examinations made by these firms, 1,300, or 4.81 per cent, proved to be infected. During 1907 the same firms examined 29,208 samples, and 928, or 3.17 per cent, were classified as containing

pus or streptococci. When the milk was found to be at fault, prompt notice of this fact was sent to the producer, and the product of the animals in question, as soon as ascertained by subsequent examination of samples from individual cows, was excluded from the supply. This attitude on the part of wholesale firms is commendable, and no doubt has assisted materially in reducing the amount of objectionable milk.

The Bureau of Milk Inspection has not been content with excluding these abnormal milks, but in every instance an effort has been made to ascertain the condition of the cows at the dairies at fault. The data obtained in this search for information was procured, for the most part, through the assistance of the contractor. Experience has demonstrated, however, that it is impossible to obtain the facts in each instance without personal investigation, and for several reasons that course has been impossible. The list which appears below offers ample evidence, however, that much of the infected milk might have been excluded by dairymen who were both observant and considerate of the public welfare. In some instances negligence was apparent, but in other cases positive disregard of the consumers' interest was demonstrated.

The following is a summary of some of these investigations of dairies (referred to by numbers), the milk from which was contaminated with either streptococci, pus, or pus and streptococci. (In some instances the findings denote mixed infection.)

1. Two cows with pulmonary tuberculosis; both were subsequently killed. One cow about to drop calf.
2. One cow about to calve.
3. Two gargety cows; one chronic. One five-teated cow giving milk from only two teats.
4. Cows in poor physical condition; these were immediately sold.

5. Herd subjected to tuberculin test; the cows responding being sold.
6. Cow with hard udder.
7. Cow with lumpy udder, thought to be due to calf leaving cow when the latter was in full milk.
8. Cow with inflamed udder from having been hooked by another animal.
9. One tuberculous cow, which was killed. One cow with three teats. Subsequent to the exclusion of the milk from these cows, the contractor learned that the milkmen whom he supplied had persistently refused, on the physical test of taste and smell, to use this milk, but after its elimination the same dealers were buying the milk of this dairy with apparent satisfaction.
10. Two hind quarters of the udder of one cow badly congested; apparently had been in this condition for some time.
11. Two cows responded to tuberculin test; they were killed.
12. Trouble due to use of milk from a three-teated cow.
13. Two dairymen refused to have their stock examined by a veterinarian. Their milk was not afterward allowed to enter the city.
14. Farmer reports one cow in a bad physical condition.
15. Cow with a sore on one teat; producer claimed this milk was not being sent to this city. Two cows with congested udders.
16. Gargety cow. Another cow which had recently calved.
17. Dirty barn; cows caked with dried manure. One cow with a swollen udder. Producer had not complied with requests made at the last inspection by the contractor.
18. Two cows with inflamed udders, one giving bloody milk. Cows subjected to the tuberculin test and some which denoted a positive reaction killed.

19. Gargety cow.
20. One cow nearly dry; another fresh from calf.
21. Cow in poor physical condition.
22. "Rheumatic cow."
23. Gargety cow; general surroundings of this dairy such that none of the milk was allowed to come to this city.
24. Cow with a swollen udder.
25. Cow in poor physical condition since calving. The existing state of affairs, due to retention of afterbirth and the attendant discharge, some of which found its way into the milk pail, was disgusting and apparent to observation.
26. Gargety cow.
27. One cow with a high fever. One cow giving milk from one teat by means of a milk tube.
28. Cow recently calved; another cow about to calve.
29. Gargety cow with swollen udder.
30. Cow with a section of the udder atrophied and discharging pus.
31. Cow with a blind abscess.
32. Cow with one teat obstructed; milk contains much pus.
33. Cow with a large abscess on udder.
34. Cow had a sliver in one teat; milk from the other quarters was being sent to market.
35. Cow recently calved.
36. Two cows nearly dry.
37. Cow with one quarter of udder badly swollen. Producer claimed that this milk was not being used; undoubtedly some of it was in the mixed supply.
38. Cow fresh from calf.
39. Two gargety cows.
40. Drying off two cows.
41. Cow with several sores on teats.
42. Five cows being dried off.
43. Cow with one-quarter of bag caked and swollen.
44. Drying up three cows.

45. Cow with garget.
46. Cow recently calved.
47. Cow with sore teats; probably the stripping was not thorough.
48. Two cows approaching the calving period.
49. Cow with sore teat.
50. Sick cow. Farmer told the milk dealer he knew the milk was "not right."
51. Cow approaching the calving period.
52. Cow with garget; giving only two quarts of milk per day and soon to calve.
53. Gargety cow.
54. Cow injured some time ago, and giving milk from only three teats.
55. Cow nearing the calving period.
56. Cow in poor physical condition.
57. Cow with two hind quarters of udder congested.
58. Cow recently calved.
59. Producer kept out of market supply only four milkings after calving. At this farm there were nineteen cows fresh from calf, and the milk from these animals was being sent to Boston.
60. Three cows approaching the calving period.
61. Cow in heat.
62. One cow in poor condition; has a cough and is much emaciated; subsequently this cow was found to be tuberculous and was killed. The barn was dirty and poorly lighted.
63. Three cows recently calved.
64. Cow nearly dry.
65. Drying off three cows; they were being milked only once a day.
66. One cow had occasionally given bloody milk, and it was thought that some of this milk became mixed with the supply sent to market. By an examination of the remaining cows in this herd it was found that

two of the animals had swollen throat glands; another had a bunch upon the udder, and the respiration of four cows was abnormal. The product of five cows was ordered excluded from the milk sent to market.

67. One cow nearly dry. Other cows being fattened and giving only two to three quarts of milk daily.
68. Cow reported as gargety. It was subsequently ascertained that this cow was a poor milker, "not giving milk freely." To obviate the difficulty, a spring lance was inserted in the cow's teats. The lance was then opened and drawn through the teat for the purpose of removing any obstruction. After this operation blood flowed from the teats for several days. Later the milk was supplied to consumers, and an examination disclosed its abnormality.
69. Gargety cow.
70. Cow with inflamed udder.
71. Two cows nearly dry.
72. One cow with a swollen udder and with respiration slightly above normal.
73. One cow with a weak quarter; another cow was found to have a "fallen hip."
74. Gargety cow.
75. Cow with caked udder.
76. The milk from seven cows about to calve was being sent to market.
77. One cow with a "puff boil" and swollen udder.

In a more recent instance, where abundance of pus had been discovered in the milk from a dairy of one hundred cows, nearly thirty animals were found with indurated udders, and one cow had an abscess upon one teat from which a purulent and offensive discharge was obtained. It is true that in this instance the product from this quarter of the udder was not being sold; but as the trouble was not localized, the milk from the other quarters, which was being mixed

with the product from this dairy, was heavily charged with pus. After the discovery of the facts, and under orders from the authorities, the cow was removed from the herd, a step which should have been taken when her condition first became known to those in charge of the stable.

In other recent investigations following the discovery of abnormal milk, nine cows in a herd of forty were found to have garget; one cow in a herd of nine was affected with garget; and one cow in a herd of six had the same trouble. These occurrences may be further duplicated, and in instances where producers were well aware of the presence of diseased animals in their herds.

The following conclusions are offered:

1. Dairymen do not exercise sufficient care in observing the condition of their stock, and do not exclude from the milk offered to the public the product of unhealthy cows, and of cows just prior to or subsequent to the calving period.
2. Apparent abnormality in cows, such as certain forms of udder trouble, afford ample warning to observant dairymen that the milk is likely to be unwholesome, and that in all fairness to purchasers and consumers it should not be offered for sale. It is nothing short of criminal for producers to permit the milk from diseased animals to be used by the public. Both decency and law demand the fullest protection for consumers.
3. While present methods afford a means of detecting this objectionable milk, producers should not await the result of such examinations, but should take the initiative in withholding milk from all suspected animals.
4. It is to the advantage of the producer to render all possible assistance, even if it entails a temporary pecuniary loss from throwing away a small amount of milk. In the end it means a greater market for his product, for public confidence in a milk supply insures a demand for increased quantities of this fluid.

5. Until the producer is willing to give the consumer the protection which is his due, the method outlined in this paper affords an effective means for materially reducing the amount of abnormal milk.

THE SURVIVAL OF B. TYPHOSUS IN MILK WHEN USED IN ORDINARY BREAKFAST-TABLE COFFEE AND TEA*

By H. W. HILL, M.D.
Minnesota State Board of Health Laboratories.

In typhoid epidemiological work, where milk is suspected as the transmission agent, it is not infrequent to encounter in the list of those sick certain ones who deny using the suspected milk, except in tea or coffee. The laity generally assume that the mixing of milk with hot coffee or tea for use at the table kills the infective bacteria. It has long been known (Sternberg) that the typhoid bacillus may be destroyed in water or broth at 60° C. in two minutes. Recently Rosenau, retesting the thermal death point of *B. typhosus* in milk, found 60° C. for two minutes ample. In view of these facts, further investigation seemed desirable. The experiments made seem to show:

(*a*) That *B. typhosus* survived in the mixture and could be recovered from it twenty-four hours after the mixture was first made, except when the initial temperature of the mixture was above 68°.

Coffee or tea cannot be used as a drink by most people at a temperature above 50° C.; hence, to secure a good, drinkable beverage does not require that the coffee-milk mixture be initially at or above 80° C.; and in practice, at the ordinary family table, it is unlikely that any but the

* Read before the Laboratory Section of the American Public Health Association at Winnipeg, August, 1908.

first two or three cups poured will show this temperature; the second and third cup furnished to any individual will almost certainly be well below 80° C.

The epidemiologist, therefore, in listing those exposed to infection from a given milk supply, should not eliminate those who drink milk only in coffee or tea. Of course, the absolute amount taken by such persons is less than by those who drink straight milk; but the milk taken cannot be considered as sterilized by the coffee or tea. The experiments made go to show that neither temperatures below 68° C., nor any inherent antiseptic virtues that the coffee or tea extracts might be supposed to possess, can be trusted to kill the typhoid bacillus. The discrepancy between the temperatures found as sufficient by Rosenau and those we found necessary in practice does not necessarily involve a contradiction. The discrepancy due simply to the fact that the accurate and exhaustive methods employed by Rosenau are not likely to be reproduced on the family breakfast table; the chilling of the outer layer of coffee-milk mixture meeting the cold china cup, the large surface of the mixture exposed to the air, the possible protection afforded to typhoid bacilli concealed within the center of milk particles coagulated by the combination of coffee extract and heat, possibly the washing up on the comparatively cool sides of the cup of a few bacteria which there escape the full heat, and later are washed back, after the mixture has cooled, will account for the results in practice.

The important point is that in advising the sterilization of milk during typhoid epidemics, a temperature which the skill and care of a laboratory test shows sufficient should have a large margin of safety added to secure the ends sought in practice, when the instructions given are to be followed by a miscellaneous assortment of domestics, ignorant mothers or even fairly intelligent people. In epidemics, boil the milk is the only safeguard, and even so simple a statement as that is not wholly satisfactory. I was asked

by a professor in a very successful business college, a bright, well-educated man, "When you say *boil*, do you mean until bubbles form, or just until it begins to steam?" Of course I told him that liquids often steamed at the freezing point; steaming is a mere question of the humidity of the atmosphere.

Carefully conducted pasteurizing by competent and careful people undoubtedly gets rid of any infection present in the milk; but I have found in one case a boy capping bottles by hand after the pasteurizing; he had a sister down with typhoid at the time, and he himself came down a little later. Although no cases have yet been traced directly to him, owing to a widespread outbreak existing at the time, it was difficult to attribute any given case to its exact source, yet the chance unquestionably existed. A very few typhoid organisms introduced into pasteurized milk would tend to multiply very much more rapidly than in raw milk and create a very dangerous menace.

On account of the danger of infecting milk in a widespread outbreak through the hands of milkers and milk handlers, I think it well to order all milk boiled, even if first pasteurized, during such an outbreak.

THE MASSACHUSETTS ASSOCIATION OF BOARDS OF HEALTH.

JANUARY QUARTERLY MEETING

Boston, Mass.

The annual meeting of the Massachusetts Association of Boards of Health was held at the Brunswick Hotel, Boylston Street, Boston, on Thursday, January 28, 1909, under the presidency of Dr. Henry P. Walcott.

The records of the last meeting were read and approved.

The following were elected to membership in the Association:

Dr. Mark W. Richardson, Secretary State Board of Health.

Dr. Ernest B. Emerson, Superintendent Massachusetts Hospital for Consumptives, North Reading, Mass.

Thomas Plimpton of the Walpole Board of Health.

Melzar W. Allen, Chairman of the Walpole Board of Health.

Dr. William H. Allen, Chairman of the Mansfield Board of Health.

Dr. Frederick H. Fuller, of the Walpole Board of Health.

Dr. Thomas J. Robinson, Chairman of the Taunton Board of Health.

Dr. Edward J. Galligan, of the Taunton Board of Health.

Dr. Frank E. Tilden, of the Easton Board of Health.

Dr. E. F. W. Bartol, of the Milton Board of Health.

Dr. Ernest H. Sparrow, Milk Inspector, Cambridge.

Dr. William O. Hewitt, of the Attleboro Board of Health.
Dr. G. Forrest Martin, of the Lowell Board of Health.
Dennis J. Murphy, of the Lowell Board of Health.
Charles H. Bossler, of Lawrence.
Dr. Peter D. McKellegat, of Lawrence.

The following report of the Treasurer was read and accepted.

ANNUAL REPORT OF THE TREASURER FOR 1908

Receipts

Balance from 1907	$1,531.71
Annual dues for 1907	18.00
" " " 1908	481.00
" " " 1909	4.00
Interest one year Central Savings Bank, Lowell	50.98
Total	$2,085.69

Expenses

Printing	$26.17
Postage	47.80
Cigars and dinners for guests	36.48
Clerical assistance	20.75
Treasurer's bond	4.00
Stenographic report of meetings	58.20
Publishing Journal	359.31
Committee on Sex Hygiene	68.61
Total expenses	$621.32
Balance to 1909	1,464.37
Total	$2,085.69

Of the above balance, $1,313.49 is drawing interest in a savings bank.

Respectfully submitted,
JAMES B. FIELD, *Treasurer.*

Examined and approved as correctly cast and properly vouched for.

J. ARTHUR GAGE,
Auditor.

January 25, 1909.

The following officers were unanimously elected:
For President, H. P. Walcott, M.D.
For First Vice-President, S. H Durgin, M.D.

For Second Vice-President, C. V. CHAPIN, M.D.
For Secretary, JAMES C. COFFEY.
For Treasurer, JAMES B. FIELD, M.D.
For Executive Committee (for two years): J. P. SCHNEIDER, M.D. of Palmer; E. L. FISKE, M.D., of Fitchburg; C. H. EIDAM, M.D., of Lawrence; F. A. WOODS, M.D., of Holyoke; GEORGE W. SMITH, M.D., of Lawrence, and M. V. PIERCE, M.D., of Milton.

THE PRESIDENT. Dr. Frothingham has kindly come here this afternoon to make some remarks upon a very important subject.

DR. FROTHINGHAM. Gentlemen, I have been asked to say a few words regarding rabies, which disease is so prevalent in Massachusetts at the present time. There is no disease which is so simple to control, which is so easy to absolutely eradicate, as rabies. The way to eradicate it is to stop your dogs from biting, and the way to prevent your dogs from biting is to muzzle them, to put on a proper, well-fitting, comfortable muzzle, that allows the dog plenty of room to move his mouth, to get out his tongue, and at the same time prevents him from biting.

I want to read you the statistics from England, the result of their enforced muzzling, and I wish the members would take a piece of paper and write down these figures, and later you can look them over and see if they are not exceedingly convincing. In the year 1887 there were 217 cases of rabies among dogs in England. In 1888 there were 160 cases, always among dogs, and no muzzling was in force. In 1889 there were 312 cases. At this time an enforced muzzling law became operative, and all the dogs were muzzled. The next year, 1890, there were 129 cases. In 1891 there were 79 cases. The muzzling law was still on. In 1892 there were 38 cases. Then the muzzling order was rescinded, the muzzles were removed, owing to certain people who objected

very much to having the trouble of muzzling their dogs. It was not the dogs' fault; it was the fault of the owners of the dogs. The next year, 1893, the number of cases went up to 93. In 1894 it rose to 248. In 1895 it rose to 672, about what we have had every year in Massachusetts for the last five years. Muzzling was now enforced once more, with the result that in 1896 the number fell to 438, in 1897 to 151, in 1898 to 17, in 1899 to 9. In 1900 there were no cases in England and Scotland and there has never been a case of rabies there since that date. The muzzling order remained on for a number of years, until they were absolutely sure that no rabies existed in England. It was then removed, and I was told last summer that the first case of rabies that appeared anywhere in the British Isles muzzling would be enforced again immediately. In the meantime they have a six months' quarantine, and no dog is allowed to land in England unless quarantined for six months. It seems to me that those figures are exceedingly convincing, and if you will look those over at your leisure I think you will agree with me. In Australia they never have had any rabies, probably owing to the fact that they have always had this six months' quarantine law.

In dogs alone last year we had 500 cases. If other animals are added to that, I think the number went over 600. I am not quite sure of the figures. There were, I think, only six cases of death in human beings last year from the disease. The year before, I think there were eight. But remember that during this time a great many people have taken the preventive treatment. Last year about 140 took the treatment and the year before about 158.

I would like to make a motion, to this effect: to instruct our Committee on Legislation to appear before the State House legislative committee and favor the proposed amendment pertaining to the dog muzzling laws. I thoroughly approve of a year's muzzling law for the entire State, and if at the end of that time we have not succeeded in materially

reducing the amount of rabies in the State, then the question can be brought up again. But I advocate, as Dr. Durgin has already for the city of Boston, a strict muzzling law for at least a year, to apply to all the dogs in Massachusetts. The present laws in this State are so worded that it is impossible to enforce them. To make them of any force or value, we must amend them. That is the object of this motion.

DR. DURGIN. The amount of notification now required is so cumbersome that it is practically useless to attempt to enforce an order of the mayor and aldermen, or of the selectmen of the towns to muzzle dogs, and it is to get rid of that superfluous and obstructive condition in the law that this amendment is offered.

THE PRESIDENT. But we still want something better. We still want to get the protection which England has.

DR. ROSE. England has sea all around it to keep rabid dogs out.

THE PRESIDENT. Of course we cannot get the same protection, but we can get a measurable protection; something infinitely better than what we have, I hope.

DR. FROTHINGHAM. That is an argument, of course, which is constantly being brought up; but supposing all the dogs in Massachusetts are securely muzzled and a rabid dog from a neighboring State comes into Massachusetts and bites ten or twenty of our dogs; our dogs being muzzled the disease cannot spread, it cannot go on; we have reduced it to a minimum. If Massachusetts takes a step in this direction, and is the first State to insist upon muzzling, the other States will soon follow. Our Federal Government is already very much stirred up about this matter, and has issued special notices regarding rabies, and it very likely will come to our assistance.

MR. NEWCOMB. In the opinion of Dr. Frothingham, what is the effect of the very lax enforcement of the dog license law in this Commonwealth as a factor in this matter? In other words, if you go after the unlicensed dogs and reduce them, you reduce the percentage of danger, and those who pay for their dogs have a little more satisfaction in their side of the case. I thoroughly indorse the idea of protecting human life; but knowing what I do about this laxity I cannot help speaking.

DR. FROTHINGHAM. It is a very sad thing that our licensing laws are not enforced, but that it seems to me cannot be greatly improved without considerable trouble. If we can get a muzzling law that will, in itself, improve the licensing problem, because then every dog that has not a muzzle will be destroyed, and consequently, any one who has a dog and who values it will put a muzzle on it and very likely pay his license also.

DR. NEWCOMB. I consider that an assumption and not a fact. It has not been proved. A man who pays for his dog license does not like that altogether, you know.

DR. FROTHINGHAM. Of course if we could have that licensing law thoroughly enforced it would be a great help; but it would not prevent a great many of our dogs, which are properly licensed and which live in our houses, from suddenly taking it into their heads to run off fifty miles biting a lot of other dogs. The owner is often more at fault than the dog.

By vote of the Association the following committee was appointed by the chair, the committee being given full power to take such action as might be necessary in the premises :

Mr. JAMES C. COFFEY, Worcester.
Dr. S. H. DURGIN, Boston.
Dr. LANGDON FROTHINGHAM, Boston.

MR. COFFEY. Mr. Chairman, there is a bill before the Massachusetts Legislature known as House Bill 690. The matter came before the Executive Committee today, and it seemed to be of such interest and of such a character that the Executive Committee thought it ought to be brought before the membership here today for action. It is "An Act Relative to Appeals from Decisions of Boards of Health of Cities and Towns." I will read the first two sections of the bill:

"SECTION 1. In all cases where boards of health of cities or towns deny petitioners a permit, license or privilege to do the thing petitioned for, having jurisdiction therein, the reasons for such denial shall be stated; and in cases where the use of property in the manner and form proposed by any petitioner is deemed dangerous to the public health, it shall be so stated among the reasons given for the refusal to grant the request of the petitioner.

"SECTION 2. In all cases where a petitioner is aggrieved by the action of a board of health, as provided in the preceding section, he shall be entitled to appeal therefrom, and have a trial by jury in the superior court in and for the county in which such petition is filed; and the verdict shall determine the right of the petitioner in the use or enjoyment of his property as set forth in his petition; such appeal shall be taken within thirty days after notice of the decision of such board has been duly served on the petitioner, by filing with such board a written notice of his claim of appeal, and the record in the case shall forthwith be transmitted to the clerk of the superior court in and for the county in which such causes arises."

If any of you who have had any experience with health work will give the matter a moment's thought you will realize how difficult it would be to carry on the work properly if we were obliged to give a reason for every act that we perform; for instance, boards of health are empowered by law to license undertakers, in some cases to license milkmen, to license scavengers. They may, for reasons which they deem sufficient, learn by investigation that the man is not a suitable person; that he is not of such a character as would warrant his being given the license for which he asks, and yet it would be difficult to prove that thing. The evidence is sufficient to satisfy the board that that man is not of such a character as would entitle him to a license and yet, under this bill, you must state the reason why you refuse. In lots of

ways the bill is pernicious and would interfere with the workings of the board. It gives them a right to appeal for a jury and delay action on some important matter.

The animus of this bill I know, because I have been concerned in the matter in Worcester. It has been started in Worcester, and put in for some action that was taken by the Board of Health in Worcester; and it was made broad enough to cover the entire State. I think that it ought to be opposed by this organization, and I move that a special committee be appointed by the chair for the purpose of approving the legislation in relation to rabies in dogs be empowered to appear before the proper committee and oppose this bill.

DR. E. H. TROWBRIDGE. I would have been very much pleased if Mr. Coffey had made a little more explicit statement or explanation of this bill. This bill is far reaching, and it is very deceptive; it is deceptive in this way, that the obstacle and the very hard task which the Board of Health of Worcester had to settle was really a petition from a person who, after not complying with the laws of the State and defying the laws of the State, then asked the Board of Health of Worcester to legalize what he had performed illegally. The illegal act which he had performed was to erect a stable within a very few feet of a three-tenement block, which would be entirely permeated by the air of that stable when the wind was blowing westerly and the windows of that three-tenement apartment were open in the summer time. This bill, while it has no mention of any such circumstances as that, certainly is a very deceptive bill and a very far-reaching one.

The motion to appoint a committee to oppose House Bill No. 690 was carried, and the following committee was appointed by the chair:

Dr. CHASE, Dr. PALMER, Mr. WINSLOW.

DR. PALMER. I desire to present the

Report of the Committee on Sex Hygiene.

Originally appointed at the meeting one year ago, this committee was organized and began its active work in April, submitting to the April meeting a report of recommendations, which it was your pleasure to accept.

The committee has recommended to the State Board of Health that syphilis and gonorrhœa be included in the list of diseases dangerous to the public health. It has requested that the State Board of Health issue to the local boards of health, for distribution by physicians and hospital superintendents, educational leaflets, or cards, similar to Circulars 1 and 2 prepared by the committee. The State Board of Registration in medicine has been asked to include prevention and cure of syphilis and gonorrhœa among the subjects of its examinations. School authorities have been urged to include judicious instruction on sex hygiene. Ten thousand copies of Circular No. 1 and 7,000 of Circular No. 2 have been printed, and a large number of these have been distributed in the city of Boston and throughout the State. A considerable number have been sent to individuals throughout the country on request, these being paid for at cost where more than a half dozen were requested. In this way about 4,000 have been sent outside of the State. Both of these circulars have been received with marked favor, and have been adopted for distribution by the Maryland Society of Social Hygiene and by the Virginia Society.

The total expenses of the committee have been $89.61. Subtracting receipts from contributions and sales, the net cost to the Association has been $75.86. The committee has not yet been able to accomplish its recommendations, but feels encouragement in the increased public interest which is taken in the matter all over the country, and desires to develop its work. Members of trade unions, church organizations, teachers' organizations, women's clubs,

public dispensaries, as well as many private physicians and individuals, have requested and received copies of the circulars, and will, to an increasing extent, use them. Six colleges, several trade unions, business men and commercial bodies and manufacturers are among those who have indicated an interest by asking for copies and stating their approval of them. The State Board of Health of the State of New York has requested permission to make abstracts or reprints of them. The Massachusetts State Conference of Charities and Correction has been induced to appoint a committee for the discussion of this subject at its next meeting. Several members of your committee have been asked to serve on the Conference Committee, of which Dr. Charles W. Eliot has accepted the chairmanship.

The Director of the Department of Zoölogy of Syracuse University, in a letter dated December 4, states that he is glad to express unqualified approval of the circulars. He has also obtained very favorable opinions from his colleagues. Dr. George W. Gay, Ex-President of the Massachusetts Medical Society, states that he is glad to see that the matter has been taken up by our Association, and he feels that good results should be the outcome of its efforts.

President G. Stanley Hall of Clark University writes an encouraging and approving letter.

The committee feels that there is a continuous need for its work, and respectfully requests that if this report is approved, its life and the appropriation which was placed at its disposal by the Association be continued through the coming year.

It was voted that the report be accepted as a report of progress, and that its recommendations be adopted.

THE WORK OF THE STATE INSPECTORS OF HEALTH AND ITS RELATION TO THE WORK OF LOCAL BOARDS OF HEALTH

By DR. ELLIOTT WASHBURN
State Health Inspector, Taunton, Mass.

The legislative enactment of 1907 which created State Inspectors of Health in Massachusetts, definitely defined certain duties for those inspectors to perform and further directed that they shall be under the general supervision of the State Board of Health, and shall perform such duties other than those specifically mentioned as that Board from time to time shall determine. The exact words of Sections 3 and 4 of that enactment are as follows:

"SECTION 3. Every State Inspector of Health shall inform himself respecting the sanitary condition of his district and concerning all influences dangerous to the public health or threatening to affect the same; he shall gather all information possible concerning the prevalence of tuberculosis and other diseases dangerous to the public health within his district; shall disseminate knowledge as to the best methods of preventing the spread of such diseases, and shall take such steps as, after consultation with the State Board of Health and the local health authorities, shall be deemed advisable for their eradication; he shall inform himself concerning the health of all minors employed in factories within his district and, whenever he may deem it advisable or necessary, he shall call the ill health or physical unfitness of any minor to the attention of his or her parents or employers and of the State Board of Health.

"SECTION 4. The State Inspectors of Health shall be under the general supervision of the State Board of Health and shall perform such duties other than those hereby imposed upon them as the said Board, from time to time, shall determine. They shall keep a record of their proceedings and observations, shall annually make a report of the same to said board on or before the thirty-first day of October, shall from time to time furnish said board with such information

as it may require touching circumstances affecting the public health in their respective districts, and shall in every instance where written suggestions are made by them to the local authorities send copies of such suggestions to said board."

Section 5 of the same Act places upon the State Inspectors of Health the enforcement of the provisions of laws relating to the light, ventilation and cleanliness of factories and workshops; to the provision of pure drinking water in such places of employment, and of suitable seats for women employees therein; to suitable water-closets in factories and workshops; to manufacture of clothing in tenements and dwelling-houses; to installing hoods, suction pipes and blowers in places where emery wheels are used for dry grinding; to the prevention of undue amounts of dust in any trade carried on in factories or workshops; to the maintenance of proper or suitable washrooms and water-closets in foundries; to certain defective sanitary arrangements and nuisances in factories; to the employment of minors in places where acids are made; and to the ventilation of schoolhouses and public buildings.

The Legislature of 1908 placed upon the State Inspectors of Health the enforcement of a law relative to humidifying in factories, and by other legislation gave to these officers equal jurisdiction with local health authorities in the matters pertaining to the sanitary conditions in slaughter houses.

The work of the State Inspectors of Health then may be briefly summarized under the following headings; he shall inform himself concerning:

(1.) The sanitary condition of his district, and all influences therein dangerous to the public health.

(2.) The prevalence of tuberculosis and other diseases dangerous to the public health in his district; and he shall disseminate knowledge as to the best methods of preventing the spread of such diseases.

(3.) The health of all minors employed in factories in his district.

(4.) The sanitation of factories and workshops, tenement houses and dwellings in which clothing is made for sale, schoolhouses and public buildings, and slaughter houses.

(5.) Certain facts relative to drainage, sewerage and water supply.

(6.) He shall also perform such other duties as the State Board of Health from time to time shall determine.

It will be seen at once that a large part of the work of the State Inspectors of Health is in extremely close relation with the work of the local Boards of Health. There is, however, this distinction: that the work of the inspectors is mainly advisory; except in the enforcement of certain laws under the heading No. 4, it is his duty to investigate and to advise. In a sense he acts as an intermediary between the State Board of Health and the local boards of health; one to whom the local board may turn for consultation and assistance; one who may give to a board asking for relief in a difficulty the benefit of experience derived from the study of the relief of a similar difficulty by some other board in his district; for it is a fact that, with the exception of the meetings of this Association, boards of health rarely confer together and one board seldom knows how another board is carrying on its work or meeting its emergencies.

There are many things in the work of the local boards of health and the State Inspectors of Health which are common to both; often the local board is perplexed as to its exact duty, and although the perplexity is very real to the board, yet it hesitates to carry the matter to the State Board of Health for advice or assistance. Now, it seems to me that this is one of the very purposes for which State Inspectors of Health were created; that it is one of the things that they are *paid to do*, to aid local boards in such perplexity. Especially does this seem true when we remember that the membership of local boards is constantly changing, most

boards changing one-third of its membership every year, while often two-thirds, or even the entire membership is changed, and so the work and duties of a local board are unfamiliar to at least one-third of its members for the first half, or longer, of every year; for there are peculiarities of public health matters which cannot be learned in a day nor a week.

Gentlemen of local boards of health, the State Inspectors of Health were not brought into being to *supplant* boards of health, but to *assist* them. It was intended that you should call upon them for assistance, and it is their duty to *render* that assistance, by themselves, if possible; but if not possible by themselves, then through the greater advisory power which stands behind them, and which is *always* at your disposal, that of the State Board of Health of Massachusetts.

Taking up in order the duties of the State Inspectors of Health, under the headings which we have made, let us consider:

(1.) The sanitary condition of the district, and all influences therein, dangerous to the public health.

The oversight and abatement of ordinary nuisances are vested in the local boards of health; such nuisances, however, are often brought to the attention of the State Inspectors of Health in one way or another, often by letters of complainants to the State Board of Health. State Inspectors of Health have absolutely no power to order the abatement of such nuisances, but may call them to the attention of the local boards, and recommend such measures to those boards as seem proper. Occasionally a local board, more especially in a small town, has hesitated to act in abating a nuisance through fear or dread of offending a neighbor or influential citizen. Recommendations from the State Inspectors of Health in such cases give these boards an added reason for acting. In common parlance, the local board of health uses the State Inspector of Health as a club, to which that

latter official does not in the least object, as he is usually some miles away—provided that the end sought, the abatement of the nuisance, is brought about.

(2.) Diseases dangerous to the public health and the dissemination of knowledge to prevent the spread of such diseases.

As you know, the State Board of Health was asked by the Legislature of 1907 to specify what diseases are dangerous to the public health within the meaning of that statute which says that physicians and others are to report to the local boards of health all cases of smallpox, diphtheria, and other diseases " dangerous to the public health " which come within their knowledge. Acting under the authority thus bestowed the State Board of Health made out a list of diseases which it deemed to be dangerous to public health, and reportable under the said law.

It is the duty of the State Inspectors of Health to ascertain the extent and prevalence of such diseases in the districts in every way that they can; to see that all cases of such diseases are properly reported to the boards of health, and if not so reported, to take proper action against the person who, having knowledge of the existence of such disease, fails to report it to the proper authority. If any board of health hesitates, for any reason, to take such action against an offender, let it be remembered that the State Inspectors of Health are expected to do this work. It is a most regrettable fact that there are in the profession to which your reader belongs, certain physicians who *do* not and ***will*** not report their cases of these diseases dangerous to the public health until they are absolutely compelled to by public criticism, or the fear of the death of their patient; and let it also be remembered that when the State Board of Health submitted the list of reportable diseases it placed no emphasis upon any particular disease; ***all*** in the list must be reported according to the law.

It is the duty of the inspectors to see that persons ill with such diseases are not neglected or improperly cared for by reason of negligence of the local authorities; to see that the State Board of Health and the local boards are notified of the existence of such diseases wherever found by the State Inspectors of Health, whether in a minor working in a factory, or in a member of a family living in a tenement house workshop where clothing is made, or which may come to their knowledge in any way whatsoever.

It is the further duty of the State Inspectors of Health to disseminate knowledge as to the best method of preventing the spread of such diseases, and to aid and assist the local boards in the enforcement of quarantine, and to take such steps as, after consultation with the State Board of Health and local health authorities, shall be deemed necessary for the protection of the public.

It is in the prevention of the spread of diseases dangerous to the public health that the relations between the local boards of health and the State Inspectors of Health are the closest. Working in harmony most excellent results may be obtained; working in discord little will be accomplished on either side; although an active local board undoubtedly will accomplish more without the aid of the State Inspector than that officer may hope to accomplish without the coöperation of the local board.

(3 and 4.) The health of all minors employed in factories, the sanitation of factories and workshops, tenement houses where clothing is made, schoolhouses and public buildings, and of slaughter houses.

The duties imposed under these headings form the greater part of the duties of the State Inspectors of Health, although these duties do not bring him in to very close contact with the local boards with these exceptions: (a) cases of dangerous diseases in factory minors, or in tenement house clothing workers, as stated elsewhere in this paper; (b) nuisances

found in factories which are not under the special laws governing factory conditions, but which come properly under the head of ordinary nuisances, and as such are under the direct supervision of the local board of health; (c) the sanitary conditions in slaughter houses over which the Legislature of 1908 gave to the State Inspectors of Health equal powers with the local boards of health.

An idea of the amount of work necessary in the examination into the health of minors and the sanitary conditions of factories may be obtained from the statement that your reader examined, during the year ending Oct. 31, 1908, the sanitary conditions of 342 factories of 63 different industries, employing 31,648 hands, of whom 3,833 were minors. This examination was made in a year of considerable industrial depression, and the inspector expects to find at least 50,000 employees, of whom 6,000, doubtless, will be minors, in his second examination of the same factories.

(5.) Certain facts relating to water supply, drainage and sewerage.

While State Inspectors of Health are not expected to advise concerning questions of water supply, drainage or sewerage, they may urge that the State Board of Health be consulted in such matters, if it seems necessary, and may point out to local boards of health, or to special committees of towns appointed to consider such matters that the assistance of the State Board of Health is obtainable. The special duty of the State Inspector of Health, under this heading, is to call attention to noxious or objectionable conditions, urge their improvement, and inform local authorities as to the work of the State Board of Health in such matters.

In order to confine this paper to the time alloted to it, it has been necessary to cite generalities rather than to give a detailed account of the work, but enough has been said to show that the duties of the State Inspectors are wide and varied, and that the relation between the work of the local boards of health and the State Inspectors of Health is, in

all their work, close and in certain parts of their work is very close.

It is hoped that the following points have been made clear:

(1.) The duties of the State Inspectors of Health are largely advisory.

(2.) The work of the local boards of health and of the State Inspectors of Health are especially closely related in the prevention of the spread of preventable diseases.

(3.) Coöperation between these two forces of public health officials is indispensable.

(4.) It is the ***duty*** of the State Inspector of Health to assist the local health authorities, and they should not hesitate to ask for such assistance.

(5.) Conferences, at frequent intervals, between local boards of health and State Inspectors of Health are highly desirable.

Gentlemen, in behalf of the State Inspectors of Health, I ask you to become acquainted with the Inspector for your own particular district.

We know that you can assist us and we believe that we can assist you.

PROFESSOR WINSLOW. I should like to offer a word of testimony, from what has come to my own notice during the year, about the work of the State Inspectors of Health. It happened that last summer an investigation of my own carried me into a good many factories in the State. Everywhere I went I found improvement in a very large proportion of the factories; I think in all the towns to which I went I found that old factories were being remodelled, bad ones were being improved, and good ones were being made even better. It astonished me to find how far-reaching and extensive the work of this body of men has been even during the first year. There is one point on which I hope very much that the inspectors may be able to extend their work in the future, and that is in the line of getting analytical data in regard to the condition of the air in the factories. Ultimately, of course, a proper system of factory inspection ought to rest on some standards as to the temperature and humidity, and carbon dioxide, and possibly, eventually, on quantitative standards as to the amount of dust permissible in different industries. Members of the Association may, many of them, be familiar with the splendid work that has been done in England by the inspectors of factories along this line in the last two or three years; first, in the accumulation of data as to existing conditions; and then in the formulation of definite standards. Something of that kind, I hope very much, may be taken up at some time here. The whole business of factory inspection in this country is at its beginning; and all over the country those who are interested are looking to the Massachusetts State Inspectors of Health for leadership in this line. There is a magnificent opportunity. Of course I realize how much there is to do, and particularly how much there is to do in connection with the broader aspects of the work, in the coördination of all the sanitary energies of the State into one vital and efficient organism; but as the work progresses, and as the more important and pressing things are done, I hope very much

that the inspectors may be able to give attention to the investigative side of the problem as well.

DR. DURGIN. I hope that the relation between the local boards of health and the State inspectors has been, as pleasing and beneficial in the other cities and towns of the Commonwealth as it has been in Boston. I hope Dr. Linenthal, whom Boston is favored with, is here, and that we may hear something from him.

DR. LINENTHAL. Mr. Chairman, the work in this district differs somewhat from the work of the other State Inspectors of Health. I have a great number of tenement workrooms to inspect. During the year I visited somewhere in the neighborhood of 3,000 such workrooms, and investigated the conditions under which clothing is made in them. These rooms, as you know, have to be licensed in order that work on wearing apparel may be carried on in them. I was very pleased to hear Professor Winslow's suggestions. I have been talking this very matter over during the dinner with one of the other State Inspectors, and I hope that we shall be able to carry on some investigations along the lines he suggested.

THE PRACTICE OF EXPOSING FOOD STUFFS TO THE STREET DUST AND ITS EFFECT UPON THE PUBLIC HEALTH

By **FRANCIS H. SLACK**

Director of the Boston Board of Health Laboratory

It is an indication of the progressive spirit of our times that agitation of any question relating to the public health receives sympathetic hearing, the people, as a whole, appreciating the value of sanitary precautions in promoting the welfare of the whole community as well as in the protection of the individual citizen. Such scourges as devastated cities and countries a few generations ago are impossible where modern sanitary regulations are enforced, but we are still subject to numerous smaller epidemics and individual cases of infectious disease, and our efforts are now directed toward bringing into control the many comparatively small unhygienic habits and customs in which we are still at fault.

Among the most important measures of preventive medicine in any community are those enforced regulations assuring it of the purity of its water and food supplies, nor can we be too careful in protecting these from possible contamination or adulteration.

Among other questions along these lines that of the propriety of exposing meats, provisions, fruits, candies, etc., which are being offered for sale outside of markets and stores, has recently received considerable attention, and regulations have been passed by the health boards of some of our cities (Brockton and Haverhill) prohibiting such exposure, es-

pecially of cooked foods and of such articles as are commonly eaten without preliminary cleansing or cooking.

A few months ago the writer was requested by Dr. Durgin, Chairman of the Boston Board of Health, to investigate this subject from a bacteriological standpoint, especially with relation to the effect of the exposure of such food stuffs upon the health of the community, with a view of discussing the question as to whether this practice was simply an unclean one, or whether it might, also, be considered actually dangerous, through the harboring by such provisions of disease organisms borne to them by dust or flies.

Prevalence of the practice in Boston. In Boston the practice of thus exposing foods is a common one, especially in the market district, some stores making a great percentage of their sales from the sidewalks. Meats are not only exposed in this way, where for purposes of drawing trade there might seem to be some excuse, but often there is but slight attempt to protect them during transportation, wagon loads of dressed meats being driven from place to place with but partial burlap covering, exposed not only to clouds of street dust and flies, but to splashing mud from wheels. In the residential sections of the city food supplies are more commonly kept inside, though even here one frequently sees boxes of vegetables tilted against the outside of the buildings near the doors, while inside, uncovered provisions are often almost equally exposed in summer because of open doors and windows.

Fruit stores, almost without exception, have open-air displays, and during the summer fruits and vegetables are peddled from hundreds of open wagons and push carts.

Candies, as a rule, are protected in glass-covered cases, but there are a few open-air displays of candies in some of the busier sections of the city, and uncovered candies are not uncommon within the stores.

Value of Bacteriological Tests. In considering the problem of making tests to ascertain if such exposure of provisions

is dangerous to public health, one must be exceedingly careful, since thousands of tests along certain lines which might suggest themselves would but result in waste of time and the piling up of negative evidence. The organisms of the infectious deseases, as a rule, carry on but a precarious existence when outside their human host, and it may safely be said that the majority of infections are by direct contact with one who has the disease, with something he has recently touched, or by infection of some medium which prolongs the life of the bacteria by furnishing them with food or moisture. Tubercle bacilli because of their resistence to long drying and the frequency with which they are scattered in sputum, are a serious menace to health; but even with these it is probable that most infections are by direct contact.

Even in epidemics traced to a common cause it is most difficult to find the infective agent in the medium at fault.

Typhoid fever epidemics have often been traced to infected water supplies, yet it is seldom that the typhoid bacillus itself has been isolated from such waters; chemical and bacteriological tests indicating sewage contamination are considered sufficient evidence, and the possible presence of typhoid inferred. Were we to search for the typhoid bacillus itself in these waters we would obtain many negative findings, but such negative evidence is of no value, the waters must still be considered unsafe.

Diphtheria and typhoid, as we know, frequently become epidemic through means of infected milk, the milk offering advantages for the spread of these diseases that provisions ordinarily do not, since milk is itself a culture medium and the living organisms which are introduced find nourishment, which encourages their multiplication; yet to seek by bacteriological examination to isolate these organisms from market milk would be an almost hopeless task, since the milk supply, as a whole, is comparatively free from infection, and when because of an outbreak of some infectious disease attention is drawn to any particular supply a sufficient

time has elapsed to allow the cause of contagion to disappear from the milk.

If, then, in polluted waters known to be contaminated with typhoid, or in market milk which when infected serves as a culture medium, the finding of these organisms of infectious disease is attended with such difficulties, we must confess that the chances of finding them by any examination we might make of exposed provisions are so exceedingly slight that such tests would be worthless.

We might, for instance, undertake feeding experiments, but knowing beforehand that our rabbits and guinea pigs thrive on provisions which have been exposed we could not hope by this means to gain much knowledge.

Culture experiments might be undertaken, exposure of sterile plates of nutrient media to the air, under similar conditions with provisions, or filtration of the air through sterile filters, plating of the bacteria thus filtered out, and the examination of the colonies obtained by species tests.

Inoculation experiments might be made of these bacteria as a test of their pathogenicity.

A thousand tests made along these lines would be of about the same value in relation to the question we are discussing as would a thousand tests of market milk for typhoid or diphtheria bacilli, were we endeavoring to find out whether such diseases were ever conveyed by milk.

In fact, such tests would be distinctly harmful, so far as the contention that the practice was prejudicial to health is concerned, in that the negative character of the results might be interpreted as meaning freedom from danger.

Study of Conditions Involved. A more profitable way to approach the subject would be through a study of the conditions involved, and an application of our knowledge as to the vitality of disease bacteria under similar conditions.

Provisions. Let us first consider the articles commonly xeposed and what they offer in the way of protection, either by natural covering or by the common processes of washing

or cooking, for it should not be overlooked that many articles of produce, meats, fish, vegetables, etc., are thoroughly cooked before being eaten, so that danger from exposure of such articles would seem to be slight aside from the results of decomposition changes which might take place through action of putrefactive bacteria. The edible parts of such fruits as bananas and oranges are also thoroughly protected.

Apples, pears, peaches, plums, cherries, grapes, berries of various kinds, dates and figs, on the contrary, are frequently eaten just as they are purchased without preliminary washing. This is, of course, also true of such foods as are sold already cooked and of candies, and whatever danger there might be would seem to be confined chiefly to these latter classes of foods.

Means by which these Foods might become Infected with pathogenic organisms are, of course, many. The most important and ordinary means would be by handling, but this does not enter into our discussion, since the foods must be handled whether exposed or not, excepting so far as they might be handled by passersby. Such handling by persons having organisms of disease on their hands would deposit the latter in a moist and virile condition and, if the food were brought and consumed shortly after, might cause disease. Coughing and sneezing by passersby might be another slight source of danger, but the chief causes of our apprehension would be from dust and flies.

Dust. The dust of city streets consists chiefly of dried and pulverized horse manure; it also contains sweepings from houses and stores, ashes, and dried refuse material of a thousand varieties, and mention should also be made of dried sputum which may contain living tubercle bacilli.

Aitken's observations led him to estimate one cubic inch of air in the open country as containing 2,000 dust particles, in a city 3,000,000.

Soper in his work in connection with the New York subway found in New York streets that the average number of bacteria

settling from the air in fifteen minutes in a 3½-inch petri dish was 1,157. The average number obtained by filtering the air was 6,500 to a cubic centimeter.

Five times as many were obtained when the wind was eighteen miles an hour as when it was at nine miles.

Bacteria in Dust. The bacteria of dust are of the more resistent types and, for the most part, harmless, since few of the disease bacteria can long withstand light and drying.

Hill, in 1902, exposed cultures of diphtheria and specimens of tubercular sputum dried on glass rods to diffuse light and found 90 per cent of the diphtheria and all the tubercle bacilli killed in three weeks. Diffuse daylight hinders the growth of diphtheria bacilli, even when other conditions are favorable, while direct sunlight has a very powerful bacteriacidal action. Experiments in 1907 in the Boston Board of Health Laboratory showed tubercle bacilli capable of producing the disease in animals at the end of thirty-one days' exposure to diffuse light. These experiments, it must be understood, were carried on with material which deposited in a moist condition was allowed to dry on either the glass or wood used, emulsions with sterile water of these dried bacteria being used for the inoculation tests. It is probable that drying was insufficient in any of these experiments to permit the bacteria thus exposed to enter the air as dust particles; action of direct sunlight was carefully prevented.

Concerning typhoid Whipple says (pp. 42, 43): "Moisture is essential to the growth of the typhoid bacillus as it is to all vegetable life. Drying is for this organism more fatal than it is to many forms, and even a short period of dessication results in death. So far as is now known the typhoid bacillus does not form spores, and there is little or no danger to be feared from dust or from the air, unless this dust or this air has had opportunity for recent infection."

The danger from dust should not be wholly ignored, for although no spores of the typhoid germs have ever been discovered experiments have indicated that among the many

individual cells of a culture a few often seem to have powers of resistance against an unfavorable environment far above the general average. Furthermore, a particle of dust dried only on the outside may harbor living germs within. Generally speaking, however, drying kills the typhoid bacillus."

Considering tubercle bacilli Jordan says (Jordan's Bacteriology, p. 336): "Sputum that is completely dried so that particles are capable of floating as dust in the air may be infective for eight or ten days, rarely longer." "Exposure to sunlight readily effects the destruction of tubercle bacilli, especially in the presence of abundant oxygen supply. The conditions of exposure determine the time necessary to produce death, but, broadly speaking, bacilli from cultures are killed in a few minutes to two hours, while bacilli in sputum require twenty to thirty hours, or even longer."

Excepting for the possible presence of tubercle bacilli, the danger of contracting contagious disease from dust would seem to be slight indeed, unless such dust was very recently infected, and in the case of tuberculosis the danger seems rather in inhalation of infected dust than through chance deposit of a few bacilli on exposed provisions. Weakened as these bacilli must be in the process of drying sufficiently to be wafted about as dust they might find in the lungs conditions sufficiently favorable to nurse them back to virulence, but would hardly survive passage through the stomach.

Then, too, there are many days that are not dusty, during or after storms, or any time when the streets are wet, frozen or covered with snow, when dangers from dust would be reduced to a minimum.

Street sweeping at night, such as is usual in market districts, is to be commended, thus avoiding the stirring up of large quantities of dust during the day when the streets are crowded. Oiling and watering the streets are wise sanitary precautions, and money spent on these means of keeping our streets free from dust is saved a hundred times over in the health of the

people, since these tiny irritating dust particles drawn into the lungs are a source of danger compared to which the danger from eating exposed provisions is small.

Flies. As we have seen there is little need of apprehension as to the infection of provisions by organisms sufficiently dry to be carried about in dust. Through flies we have a means by which if opportunity offers organisms, in a moist condition, may be so transferred. The average fly is equally fond of filth and food, and frequently passes from one to the other when both are exposed to his depredations.

I quote from Whipple again (Whipple, p. 67): "Flies may transmit the typhoid bacillus in two ways, by the fecal matter containing the germ adhering to the fly and being mechanically transported, or by the fly taking the germ into its digestive organs and depositing it with its excrement. An interesting illustration of the first method of transmission was the experiment made by some one who sprinkled lime in a privy vault and exposed a chocolate-frosted cake in front of the kitchen window not far distant. It was not long before the white tracks of the flies were found on the cake. A more definite experiment was that made in Chicago where flies caught in certain privy vaults were examined and found to contain *B. typhi.*

Some experiments have been conducted to ascertain the duration of life of the typhoid bacillus on the bodies of flies fed on infected milk. These experiments were not wholly satisfactory, but Fischer states that he found them there twenty-three days after infection."

(Whipple, p. 191): "In the autumn of 1904 a typhoid outbreak occurred in the New Haven County jail. Out of 256 prisoners there confined, 20 were attacked between October 6 and November 15. A study of the situation by Prof. H. E. Smith and Mr. Edward Mahl resulted in the exoneration of the water supply and the milk supply. They found that on the street adjoining the jail there were five dwellings in which cases of typhoid had occurred between August 2 and

September 17. The privies in the rear of these houses were in a very filthy condition and, in several instances, fecal matter was found lying exposed on the surface of the ground. The food furnished to the prisoners was prepared at the jail and often exposed on tables in front of open windows, which were not screened. Flies were abundant at the time, and it is a well-known fact that at that season of the year they seek the warmth of houses. The investigators concluded that the outbreak was due to the transfer of infectious matter by flies from the privies to the food furnished the prisoners."

Such cases are interesting as showing the probable danger from flies where unsanitary conditions prevail.

Danger of infection of exposed foods would certainly seem to be great where flies had access to these, and also to infected feces. In a city where sewers are so universal as in Boston, however, we need fear little danger from typhoid infection of food by flies. There remains a possibility of such infection, however, through carelessness or delay in disposing of typhoid stools.

There would seem to be more danger of flies carrying tubercle bacilli from sputa deposited on the streets. This danger, if present, has also been reduced by the well-enforced laws against spitting on the sidewalks; and by the instructions now given to all consumptives as to the infectiousness of the sputum and care necessary to prevent infection of others. Such danger as there is from flies, is of course, confined to the warm weather, and it must be said that in such weather, when conditions are most favorable for tranference of these bacteria, the agents of their destruction (light and drying) are also most active,

In bringing this paper to a close I cannot refrain from speaking of the frequency of erroneous ideas as to the vitality outside of the body of the organisms of the ordinary infectious diseases.

Thirty years ago the germ theory of disease had to fight for recognition, now the pendulum has swung to the other

extreme and people are willing to believe the most improbable stories of germ infection.

Bacteriologists, health officers and physicians are in a way responsible for this, since it is only of late that such a theory as danger of infection from sewer gas, for instance, has been proven to be without much foundation in fact. Not knowing the limitations of bacterial resistance we have erred on the side of overcaution, and thus false impressions have been spread abroad as to the dangers of infection from *things*, and the greater dangers of infection from *persons* are overlooked.

These impressions are sometimes pandered to by writers in popular magazines.

The *Ladies' Home Journal*, for example, on its editorial page for June, 1904, offers the following:

"THE CANDY THAT WE EAT

"A prominent physician, whose word is equivalent to that of the highest authority, was standing beside the candy counter in a large department store, not long ago, when he said:

"'Just look at those women buying that candy for themselves and their children. That candy has been exposed all day, while hundreds of people have passed by, shuffling their feet and raising thousands of particles of dust from the floor.

" 'Most of that dust is brought from the street and contains every kind of the most dangerous germs and microbes of disease. Candy is, of course, sticky, and on account of its adhesive character everything sticks to it.

" 'Last week I came here and bought a quarter of a pound of each of four different sorts of candy which had been exposed on that counter only during the morning—just three hours, remember. I put the mass under the microscope and amazed my clinic with what they saw. There were typhoid

and malarial germs absolutely without number; the candy was literally covered with them. It is natural, of course, that it should be.

"'Now these same women would not think of using a piece of meat that had been exposed without washing it and, of course, in the roasting or boiling process all bacteria are destroyed; the same with vegetables; but candy which, on account of its sticky nature, is a thousand times worse, is eaten just as it is bought and as it has laid exposed upon the counter, and yet mothers wonder why their children have diseases! It is a fact seldom realized that more germs are carried into children's systems through eating candies that have been exposed for sale than in any other way. [We cannot help wondering if the learned doctor ever heard of milk.] No candy should be bought unless it had been packed in a box directly after making, and under no circumstances should any be bought that has been exposed on a counter or in a box with the lid off; even when it is under a glass case there is danger, since its stickiness holds every grain of dust and throws nothing off.'"

Now since malarial plasmodiæ have never been discovered outside the bodies of the human or mosquito hosts, and since the isolation and proving the identity of the typhoid bacillus is a piece of work requiring several days this story, so far as it relates to these organisms, is false on its face. The evil of it is, in the fact, that ninety-nine out of a hundred who read such an article believe it to be true, and not only live in fear themselves, but pass on such false eachings to others.

Another writer who states he is a health officer writing for a popular "Mothers Magazine," makes this extraordinary statement:

"A single rotting potato left in a dark corner of the cellar will generate enough typhoid and diphtheria bacilli to infect a whole community."

Uncle Remus Home Magazine for January, 1909, offers this

contribution which, while not so glaring in its errors, conveys the same idea:

"I had a surprise this afternoon," said the feather-brained wife of the city councilman. "Maude Whitney has been telling us that her husband has been appointed sanitary inspector. Of course I thought it was a respectable business where he would sit before a desk and dictate to a typewriter. Well, this afternoon he was here spying about in my back yard, poking into that rubbish heap in the corner and smelling out that little pool where the Pekin ducks like to paddle, and he said they must be done away with; they were a menace to health; and I found out that was his business — poking about in back yards. That's what a sanitary inspector is, and I thought it was some *important office*."

"It is the most important office in the city," declared her husband, "for its mission is to preserve health and prevent disease. Do you know how many deaths there were in this city last week from typhoid fever and diphtheria? And much of this sad mortality is due to the condition of the back yards of such careless people as we are."

The writer in the *Ladies Home Journal* was correct in one particular: candies should be kept covered and not open to all kinds of exposure.

The *Mothers Magazine* writer was correct in his opinion, that it was a wise, sanitary precaution to keep the cellars clean.

The writer in *Uncle Remus Home Magazine* was correct in his contention that it was most important to keep back yards clean, and had he spoken of yellow fever and malaria instead of typhoid and diphtheria, his article might have passed without adverse comment, for these diseases are spread by mosquitoes which might breed in the puddle spoken of; but all these articles convey false impressions, the first two, in fact, are direct falsehoods.

Let us teach people to be clean, but not attempt to frighten them into it by untrue statements which, eventually, will react and do more harm than good.

There are surely enough dangers, real, active, at hand, without manufacturing imaginary ones.

The writer would not wish to be misunderstood in anything he may have said as being opposed to protection of food stuffs from dust and flies. Such protection should be demanded, if only from the standpoint of common decency and cleanliness. Viewed from the standpoint of *public health* he draws the following conclusions:

1. Such exposure of fresh meats and fresh fish is harmful chiefly because of more rapid decomposition changes which may take place.
2. Exposure of vegetables which are commonly washed and cooked before being eaten cannot be condemned.
3. We must recognize the presence of possible danger from dust and flies in the exposure of cooked foods, or of such other foods as are commonly eaten without preliminary cleansing or cooking, although in a city with modern sanitary arrangements there is probably very slight detrimental effect on the public health.

DR. BURR. Dr. Slack has taken up this question from the side of the danger of the transmission of disease to persons from exposed food articles so well that there is little left for me to say on this point. I think he is right when he says that contagious diseases, and I would include tuberculosis, are probably not transmitted through the agency of foods exposed to dust and dirt. The danger from dried sputum would be nothing compared to the handling of food articles by consumptive patients.

The question of flies as a carrier of disease is of course more or less serious. Dr. Slack states: "Through flies we have a means by which, if opportunity is offered, organisms may be transferred." I would say that if flies are a carrier of disease that there is no end of opportunity for them to transfer it to exposed food articles. An expression of opinion as to the amount of exposure cannot be exaggerated. The

practice of exposing food articles has increased to disgusting conditions. All sorts of cooked and uncooked meats, fish, lobster meat, oysters on the half shell with lemons all ready to serve, cut meats, as steaks, roasts, etc.; dried beef, pickled meats, and about every other description of food, is now exposed on the streets, shelves, outside of windows, open windows, and the entire fronts of stores are now trimmed with these various articles. This practice, up to a few years ago, was confined to the large market district. It is a fast-growing practice in our suburban districts.

That the dust and filth of streets reaches these foods there can be no doubt. One has simply to travel through the market districts any dry, windy day to confirm this. This question, in my opinion, should be reached from the side of cleanliness, and not as to the danger of transmission of diseases.

We legislate against dirty yards, alleyways, etc., and we certainly should consider dirty foods as much of a danger as dirty yards.

Dr. Slack, in ending his paper, drew four conclusions. First, exposure of fresh meats and fish is harmful because of decomposition. I would say that the exposure of vegetables of all sorts should not be allowed. You will find bushel boxes on the sidewalks tilted up against buildings, exposed to all small animals.

Third, exposure of cooked foods should be forbidden, especially in summer. I should certainly make no exception of any season of the year. Foods are exposed to all filth as much during the month of March as at any other time.

Fourth, I do not think the question of the effect on the public health should be considered. This question should be considered from the standpoint of cleanliness.

I should favor any recommendations that might prohibit the unnecessary exposure of all food articles.

MR. NEWCOMB. I may say for Salem, as Dr. Durgin

did in regard to Boston, we are very happy to be in touch with our District Medical Inspector, Dr. Voss. Our relations have been very pleasant. At times I have been an eye-witness to the soiling of food of quite a perishable nature when placed upon the sidewalks, and have called it to the attention of the clerks and the proprietors of the places of business.

Through the following regulations we are trying to control this practice:

"CARE OF MEAT, POULTRY AND VEGETABLES

"REGULATION 27. SECTION 1. No person or corporation, individually or by his agents, servants or employees, shall transport meat or poultry of any description through the public streets or ways of the city of Salem, except in wagons or vehicles which have been thoroughly washed at least once in every twenty-four hours."

All meat or poultry transported through the streets and public ways must be thoroughly covered in such a manner as to preclude infection or injury from flying dust or other causes.

SECTION 2. No meat, poultry, fish, dates, figs, berries or shelled nuts shall be exposed for sale in any public street or way, or by the side of same, or in any open display window, unless covered in such a manner as to exclude flies and dust.

SECTION 3. No article intended to be used as food shall be exposed or displayed in any street or way, or in front of any place of business, unless the bottom of the box or other receptacle containing such articles, is raised, at least, twenty-four inches above the sidewalk, platform or landing upon which such receptacle rests.

We have found indications, at times, proving clearly that the owners were not living up to the first section, but the general compliance is good.

DR. A. W. PACKARD. This is a matter in which the board

of health in the city from which I come (Brockton) is vitally interested. In June, 1905, that board adopted a regulation as follows:

"SECTION 1. No person shall allow the body of any animal, or part thereof, or any bread, pastry, poultry or other provisions which may be used as human food, to be carted or carried through the streets or avenues of the city of Brockton, unless it be so covered as to protect it from dust, dirt and flies.

"SECTION 2. No cherries, blackberries, huckleberries, raspberries, strawberries, grapes, dates, figs, salted peanuts, cracked nuts of any kind, corn cakes, corn crisp, candy of any description, maple sugar, or any other article, or food stuff which may be used for human food without cooking or peeling, shall be kept or exposed for sale in any street, or public place, or outside of any shop or store, or in the open window, or doorways thereof, unless they be kept covered so that they shall be protected from dust, dirt and flies.

"SECTION 3. No vegetables or other articles which are to be used as human food shall be kept, or placed, or exposed for sale outside of any shop, store or market, or in the open window or doorways thereof where it is possible for such vegetables or other articles to be contaminated by dogs.

"SECTION 4. Every person being the occupant or lessee of any room, stall, building, or place where any meat, fish, birds, fowl, milk, vegetables, butter, fruit or other articles intended or held for human food, shall be stored or kept, or shall be offered for sale, shall put and keep such room, stall, building or place, and its appurtenances, in a clean and wholesome condition; and every person having charge or interested or engaged, whether as principal or agent, in the care or in respect to the custody or sale of any meat, fish, birds, fowl, milk, butter, fruit, vegetables, or other articles intended for human food, shall keep, protect and preserve the same in a clean and wholesome condition, and shall not allow the same, or any part thereof, to be poisoned, infected or rendered unsafe or unwholesome for human food."

This regulation has not only been in force for three years, but it has been subject to the action of the courts and has been sustained. It is a fact that it is possible to enforce this regulation in small cities while, as has been intimated, in larger cities, like Boston and New York, it is much more difficult. New York has a very similar regulation, but they admit, on account of their size, that it is impossible to enforce it, and in Boston it is a very great problem; but in smaller cities it is possible to enforce the regulation. I wish that we had time and might discuss this regulation, and that the

board of health of this city might know whether the regulation has the indorsement of this Association of boards of health or not. Are we too far in advance of the education of the public? If so, should we come down, or should we bring, by education, the public up to an actual compliance with the regulation? I should like to know what the mind of the boards of health of the smaller cities and large towns is in regard to a regulation of this kind.

DR. DURGIN. It was with a view of getting a general expression from boards of health of the State that this paper was produced, and it was with the hope of securing, ultimately, united action on the question. It is exceedingly important that this question should be discussed by boards of health, as it will fall to them to create and execute regulations in this case. It seems to me important that there should be a committee of judicious, experienced men, to consider and report how far we may go in the prohibition of a custom which has grown to great dimensions, and is a source of much anxiety, especially with those who have assumed that it is seriously dangerous. Whether it has a large or a small degree of danger, it is sufficient that we know it to be an unclean procedure and attended with some risk of infection.

DR. SLACK. I would like to say that I heartily agree with what has been said by these gentlemen, and it seems to me that it is right along the line of the paper. I was asked to examine the subject simply in relation to its effect upon the public health. The remarks have been chiefly as to the cleanliness, and on that we all agree that the custom is an unclean one and a filthy one, and should be abolished. I would like to make a motion, that a committee of three be appointed by the president to report at the next meeting as to what extent exposure of food stuffs for sale should be prohibited by boards of health.

The motion was adopted, and the following committee appointed:

Dr. Slack, of Boston.
Dr. Emerson, of Springfield.
Dr. Packard, of Brockton.

PERSONAL HYGIENE

By PERCY G. STILES, Ph.D.

Instructor in Physiology, Massachusetts Institute of Technology

THE EFFECT OF SHAKING UPON ENZYMES. Certain curious facts reported by Dr. S. J. Meltzer and his associates at the recent meetings of the scientific societies in Baltimore, seem to call for comment in this place. These workers have shown that a solution of pepsin may be entirely deprived of its digestive virtue by prolonged and vigorous shaking. They have found that such a solution may be greatly weakened by the odd expedient of placing it in a sealed tube and introducing this into the stomach of a dog, where it remains for twenty-four hours. The contents of the tube thus suffers the combined effects of gastric, respiratory and bodily movements of the "host." It has been demonstrated that bacterial toxines may be weakened, or rendered inert, by similar agitation.

The chief reason for mentioning these observations is the possibility of misunderstanding their meaning and scope. It will not be strange if popular articles are soon printed in which these facts are used to enforce a claim that digestive juices in the body require quiet conditions for the performance of their work. It will puzzle some more careful thinkers to reconcile the new statements with the plain truth, that moderate stirring of a mixture undergoing digestion promotes the process instead of retarding it. A mild cradling and overturning of the fluid contents of the stomach and intestine goes on constantly, though it is gentler than the layman is

apt to assume. Food in the alimentary canal is subject to the same physical disturbance by the local musculature, the diaphragm, and the general movements of the body which proved so injurious to the enzyme in Meltzer's experiment.

The point to be emphasized is that it is quite a different matter to shake an enzyme alone from what it is to shake it with a substance on which it can act. Enzymes readily adhere to other materials. This has been shown by the employment of harmless precipitates such as calcium phosphate to remove enzymes from solutions. Organic colloids may act in the same way. Now, if it is a property of enzymes to adhere (to undergo adsorption) upon a foreign surface of any kind, then we can understand why shaking a digestive solution may destroy its power. The enzyme may be removed by contact with the walls of the container, the agitation merely insuring that all portions of the solution make such contact. Doubtless some glass beads in the vial would hasten the removal. It is also conceivable that the molecules of the enzyme when shaken may condense into inactive aggregates.

It will be quite otherwise when the food to be acted upon is present. The shaking which before tended to deposit the enzyme in a useless film upon the enclosing surface, or to throw its molecules together in inert clumps, will now favor the adhesion of enzyme and substrate. This is not a permanent entanglement like the other, but is the preliminary condition of digestion. The enzyme is soon set free as an incident of the cleavage, and is ready to be used again. We think that in this way the seeming contradiction between Meltzer's results and the common practice of stirring mixtures to promote enzyme action happily disappears.

It seems safe to predict that before long we shall read in the Hygiene columns of magazines statements to the effect that the workers in the Rockfeller Institute have proved that muscular exercise suspends digestion — a new argument in

favor of after-dinner naps in the manner of the carnivora. We may admit that violent activity after a full meal is undesirable, but the reason this is so is not the sensitiveness of pepsin to shaking. It is, doubtless, the difficulty of supplying blood adequately to all parts of the body at the same time, coupled with the loss of water through the sweat-glands, which may tend to lessen the digestive secretions. The instinct which leads us to rest after eating is a physiological one, but fortunately, for our efficiency, it is felt only within the first quarter of the period of digestion. Most of the necessary changes in our food are made in the later hours of the period when we are as active as we choose. If we can secure a good initial flow of the juices the danger that we shall shake them into impotence appears quite remote.

VETERINARY HYGIENE*

By W. L. BEEBE, D.V.M.

Bacteriologist for the Minnesota State Live Stock Sanitary Board

THREE DISEASES IN ANIMALS WHICH HAVE RECENTLY ASSUMED IMPORTANCE TO THE STATE SANITARIAN.* In this article J. R. Mohler, chief of the Pathological Division, Bureau of Animal Industry, calls attention to the existence in America of infectious anæmia (swamp fever), chronic bacterial dysentery (Johnne's disease and mycotic lymphangitis (pseudo farcy).

Infectious anæmia is also called American sura, malarial fever and typhoid fever in horses. The cause has been definitely determined as an ultra-microscopic organism, that is capable of passing through the first Pasteur filter.

The disease is most prevalent in low, badly-drained sections of the country, although it is also present in altitudes 7,500 feet in height, on marshy pastures. The disease is characterized by progressive pernicious anæmia, remittent fever, polyuria and gradual emaciation while the appetite remains good. The duration of the disease is from three months to a year, or even longer in some cases. The temperature may rise to 103°, or higher, while the pulse will reach 70 beats per minute. The temperature usually remains high for several days, then gradually drops to about normal, but raises again at irregular intervals. The blood shows a gradual but marked diminution in corpuscles, the count running as low as 2,000,000 per cubic millimeter. Œdematous

* Paper read at the Interstate Association of Live Stock Sanitary Boards, September, 1908, and published in the American Veterinary Review for November, 1908.

swellings sometimes appear on the lower lip, point of elbow, sheath, legs, under the belly, or on some other pendant portion of the body.

The most marked lesions after death are marked emaciation, effusion in the pleura, pericardial or abdominal cavities, and many times petechial hemorrhages in the subcutaneous or muscular tissue, the heart, lungs, on the pleura or peritoneum. The heart is usually enlarged, and of a very pale color. The kidneys may appear normal or anæmic and flaccid. Microscopically they usually show a chronic parenchymatous degeneration. Many times some of these lesions are absent; in fact, it is surprising to see how few macroscopical lesions are present.

The mortality is about 75 per cent, and so far treatment has been very unsatisfactory.

Mycotic lymphangitis is a chronic contagious disease, particularly to equines, caused by a specific organism, *saccharomyces farciminosis*. It is characterized by a suppurative inflammation of the subcutaneous lymph vessels and the neighboring lymph glands. In chronic cases it is very easy to confuse with glanders, but a microscopical examination will reveal the saccharomyces in unstained specimens as slightly elongated bodies, 3–5 microns long, and 2.4–3.6 microns broad, with highly refractory double outline. The presence of this disease in the United States was first observed by Pearson in Pennsylvania in 1907, although it is possible that it had existed in this country for many years. Since that time its appearance has been established in Ohio, Iowa, California and North Dakota, and there is a probability that it exists in several other Western States. It is quite prevalent in Porto Rico, Hawaiian Islands and the Philippine Islands.

Treatment consists at the onset of the disease of exterpation of the nodules, lymph vessels and lymph glands in the vicinity. The organisms are highly resistent to antiseptics so very strong solutions should be used.

Chronic Bacterial Dysentery, or Johnne's disease, is a chronic infectious disease of bovines, caused by an acid-fast bacillus resembling the tubercle bacillus. The disease is characterized by marked diarrhœa, anæmia and emaciation, terminating in death. The duration of the disease is from six weeks to a year, or even longer.

The lesions observed upon post-mortem are remarkably slight, and out of all proportion to the severity of the symptoms manifested. The most marked lesions are present usually in the small intestine, especially in the last third, and occasionally the large intestines are also involved.

The intestinal mucosa shows a wrinkled or corrugated appearance. The mesenteric lymph glands are usually somewhat enlarged and appear watery on cut section. The acid-fast bacilli can be easily found in smears from the affected intestinal mucosa or lymph glands.

Recently this disease has been observed by Pearson in Pennsylvania, Beebe in Minnesota, Mohler in Virginia, and in an imported heifer from the Island of Jersey at the Athenia quarantine station ofthe Bureau of Animal Industry.

Foot and Mouth Disease in America. For the second time in recent years the Bureau of Animal Industry, United States Department of Agriculture, has been engaged in combatting foot and mouth disease, which was first recognized in this country Nov. 11, 1908. The States where this disease made its appearance were Michigan, New York, Pennsylvania and Maryland. The work of eradication has been carried on vigorously in coöperation with the State authorities. The diseased and exposed cattle were slaughtered and buried, and the premises disinfected. The Department paid the owner of the cattle two-thirds of the appraised value, and the remaining third was paid by the States.

One hundred and forty-eight herds were found affected, and the cost of paying for the diseased cattle amounted to $88,269.08. The prompt mastery of this highly-contagious and dreaded plague, which is always more or less prevalent,

speaks highly for the Bureau of Animal Industry. The general public and the live stock interests of the country are fortunate in escaping great disaster that would have resulted had this disease once become established in the western States, where the cattle raising is carried on extensively. There is a slight possibility that this disease may again appear on some of those infected farms, but as they will be constantly guarded no great harm may come from it.

MUNICIPAL SANITATION *

By CHARLES V. CHAPIN, M.D.
Superintendent of Health, Providence, R.I.

TYPHOID CARRIERS, INTERMITTENT ELIMINATION OF BACILLI.† Attention has previously been called to the fact that bacilli are not constantly present in the feces of carriers. Davies and Hall (*Lancet*, Nov. 28, 1908, page 1,585) have still further studied the carrier whose history had been reported. They find that the feces remained free from bacilli for considerable periods. Semple and Greig,* working in India, report three carriers, the daily examination of whom resulted as follows: In one the urine contained typhoid bacilli on Aug. 7, 1907. It was then examined daily with negative results until September 8, when the bacilli reappeared. In another case the feces showed bacilli on August 12 and 13, and then daily examinations were negative until August 29, when typhoid bacilli were again found. Another carrier's feces had a free interval from August 1 to September 6, and another from August 7 to October 21, a period of seventy-five days. In the light of such evidence it seems very unwise, at present, to attempt to rely on bacteriological examination of feces and urine to determine whether a person is infected and a danger to the community. The difficulties in the way of applying such a test to determine when restrictions shall be removed from typhoid patients, as for instance when connected with the milk business, are very great, and as it now appears to be extremely unreliable health officers had best not attempt to rely upon it.

* American Journal of Public Hygiene, Vol. XVIII, p. 350.

† Sci. Memoirs, Medical and Sanitary Departments Government of India, n.s., No. 32, p. 8.

SANITARY ENGINEERING NOTES

By ROBERT SPURR WESTON
Assoc. M. Am. Soc. C.E.

SERIOUS POLLUTION OF THE PREGEL, ITS CAUSE AND REMEDY.* The water of this river had never previously caused trouble when, toward the end of July, 1905, at the town of Konigsburg, it suddenly became black, and for about a week gave off very offensive odors. Investigation showed that for several years a cellulose manufactory above the city had been discharging its waste into the river at a rate that had reached about 48,000 kg. of dissolved organic matter, or the equivalent of 240,000 kg. boiled potatoes per day. The fall of the Pregel is very slight, and it empties through two mouths, one of its branches flowing west, so that when strong west winds prevail the water backs up from this side. As west winds are only common in winter this had hitherto caused no trouble, but at the time in question strong west winds had blown for a week during hot weather. During this period there must have collected at the city almost 700,000 kg. of organic matter which, in the presence of the organisms supplied by the river mud putrefied most effectively. To remedy this condition of affairs it was finally decided to pump the acid calcium sulphite in which the wood is boiled in the course of the process, and the first wash waters, after reduction of the acidity to 0.06 per cent by addition of lime, into the drainage canals which empty upon irrigation fields. This arrangement will be in operation in the course of another year.

H. R. HOSMER.

* Lassar-Cohn, Chem. Ztg., 81, 980-81 (Oct.).

WATER-SOLUBLE HUMUS MATERIAL IN THE NORTHERN SWEETWATERS.* From results of analysis of the seven largest rivers of Finland the author estimates that the iron humus matter emptied into the sea by them is about 1,400,000,000 kg. per year. These rivers represent 90 per cent of the total drainage of the country. Complete analyses were made on six lake and river waters, and the humus matter from each was precipitated by addition of the proper amount (determined separately for each water) of $FeCl_3$ and analyzed for C, H, O and N content. The results were as follows:

	Water from	C	H	N	O
1.	Wanda (filtered)	46.87	4.42	2.29	46.42
2.	" (unfiltered)	47.11	4.80	2.20	45.89
3 a.	Lake Kalaton	54.10	3.86	2.32	39.72
3 b.	" "	52.94	4.09	1.90	41.07
4.	Lojo-See	44.99	5.05	2.07	47.89
5.	Moor-See Ukonlampi	48.98	4.24	2.88	43.90
6.	" " Heinälampi	46.19	4.42	1.46	47.93
7.	" " Myllylampi im Kirchspiel Lojo	52.03	4.98	4.23	38.76

These results do not indicate any definite compound, though aside from the low proportion of *N* the composition approaches that of albuminoid substances, as there is little or no ammonia in the water. *S* is sometimes present in traces, and small amounts of *P* in organic combinations are always found. Decomposition by dilute alkalis and precipitation of alkaline solutions by acid indicate that the humus matter has the characteristics of an acid of about the strength of phenol. Analyses show that though the metals are not present as any definite compound with the coloring matter, the proportions vary only between narrow limits. Normal salts of bivalent metals do not cause decolorization of the water except $FeSo_4$, which requires so long that probably it undergoes oxidation first, and $MnSo_4$ which, after several days, gives a precipitate of black gela-

* O. Aschan (Helsingfors, Lab. Univ.), J. pr. Chem., 77, 172-88. (Feb. 6)

tinous hydroxide, in whose formation the humus must play a part since it does not take place in distilled water. $Al_2(So_4)_3$ and $SnCl_4$ also decolorize. If more or less than the precipitating quantity of $FeCl_3$ be added to the water it grows gradually darker up to a certain point, after which it may remain unchanged for a number of days, at last precipitating all at once. Small quantites of acid or alkali cause immediate precipitation, hence the deepening color is not due to hydrolysis. Moreover, the strongly-dissociated salts as NaCl prevent precipitation to a greater extent than do strong acids or bases, showing that is not an ion effect alone.

BIOLOGICAL PURIFICATION OF SEWERAGE ON A LARGE SCALE.* A reply to a communication of M. Vincey, advocating the agricultural irrigation system of sewage disposal for Paris. The author contradicts his opponent's statements in detail, claiming that his analytical data are unreliable, his deductions incorrect and his estimates unfair and prejudiced. The paper is made up almost wholly of statistics and quotations to show the advantages of the bacteriological treatment.

CALCIUM CHLORIDE AS A PREVENTIVE OF FREEZING IN AUTOMATIC SPRINKLER SYSTEMS.† A strong solution of $CaCl_2$ is introduced into the pipe system, and kept from diffusion back into the water main by check valves. It is found that, in spite of the high coefficient of expansion of $CaCl_2$ solutions, no contrivance for relieving the pressure due to change of temperature is necessary, because the elasticity of the network of small pipes is sufficient.

R. S. WESTON.

* M. B. Bezault, Bull. Soc. Encouragement, 110, 23-48 (Feb.).

† Eng. News, 60, 550.

BIOLOGICAL LABORATORY NOTES

PRODUCTION OF DISINFECTANT GAS.* The author finds that if three parts of water be added to a mixture of one part of paraformaldehyde and two of $CaCl_2$, formaldehyde gas is freely liberated. This gas contains only traces of Cl and does not exert an injurious effect except upon certain aniline dyes. Mildew spores under two layers of cloth were killed in seven hours in a test made in a room containing 20 c.m., with 125 g. of aldehyde. Subtilis required seven days.

H. R. HOSMER.

USE OF CONCENTRATED SALT SOLUTIONS IN DIFFERENTIATION OF BACTERIA. SEPARATION OF *B. TYPHI* FROM *B. COLI*.† The author claims that the addition of 20 per cent Na_2So_4 to a broth tube does not affect the manner of growth of *B. typhi* producing uniform turbidity, but causes the *B. coli* to agglomerate and finally settle in compact form. Phosphates produce the same effect, though nitrates, chlorides and non-electrolytes do not. *B. enteritidis* and *paratyphi A* (Byron-Kayser) behave like *B. coli*, distinguishing them from *paratyphi B* (Shottmüller) and the bacillus of Achard. If a U tube be prepared with a plug of cotton inserted down to the curve, filled with broth and inoculated, after growth becomes apparent it will be found that the liquid above the plug contains a pure culture of typhi while coli remain at the bottom.

H. R. HOSMER.

* G. Carteret, Comp. rend. 146, 819-20 (April 13).

† M. A. Guillemard, Compt. rend. 146, 1177-9 (June 1).

A NEW GENUS, PARASITE OF CHRYSOMONADINA, LECYTHODYTES PARADOXUS.* This parasite has an elongated form pointed at the extremities, and furnished with two flagella. It enters the sheath of the chromulina through the neck elongating itself for the purpose like an amœba, and then absorbs the protoplasm of its host until it fills the whole shell. The organism remains without cell wall throughout its existence, multiplying by means of zoospores formed by successive bi-partition, accompanied by a corresponding division of the nucleus. These zoospores often remain for some time in the sheath of the chromulina, at last passing out through the neck as they entered, being ready, then, to attack new victims.

H. R. HOSMER.

* P. A. Dangeard, Compt. rend. 146, 1159-60.

PUBLIC HEALTH LEGISLATION, NEWS AND NOTES

By F. H. SLACK, M.D.

Director Boston Board of Health Laboratory

PACIFIC COAST PUBLIC HEALTH ASSOCIATION.* The State Boards of Health of California, Oregon and Washington, together with the representatives of the health departments of the principal cities of these States, held a meeting in Portland, December 15, and perfected an organization to be known as "The Pacific Coast Public Health Association."

The object of the association is uniform and harmonious work in protecting the Pacific coast against communicable disease.

The following resolutions were adopted:

> The association desires to publicly recognize the character and value of the work that has been done in the places on this coast where bubonic plague has appeared. This work has been successful in stamping out the disease among human beings and reducing it to a minimum among rodents; achievements of no small moment, when the general history of the disease in the present pandemic is taken into consideration.
>
> But while recognizing the thoroughness and the value of this work, the association desires to call attention to the peculiar nature of the disease, in that its permanency in a community does not depend upon its existence among human beings, but rather among rats. And while the epizootic is at present held in abeyance, its peculiar pesistence must not be forgotten. In view of the foregoing, this association does hereby resolve:
>
> First, That, in its opinion, the necessity of continuing the work of fighting the disease in the places where it has made its appearance still exists, and that the work should continue unabated for an indefinite period. Such work to include the catching and extermination of rodents.

* Monthly Bulletin, California State Board of Health, November, 1908.

Second, That reasonable precautionary regulations for vessels should be continued, this to include the fumigation of vessels in accordance with a uniform plan for all ports interested.

Third, That all municipalities of the States and provinces included in the boundaries of this association, shall put uniform preventive measures into effect in accordance with recommendations of the association.

Following are the recommendations adopted:

1. The destruction and examination of rats for the plague.
2. Disinfection of all vessels at least once each month.
3. Sanitary improvements of such character as to secure efficient collection, care and destruction of garbage and stable offal.
4. Rendering all buildings, docks, warehouses, markets, etc., rat proof.

With reference to the subject of tuberculosis the following resolutions were adopted:

The Public Health Association of the Pacific Coast, while recognizing the necessity for travel on the part of those afflicted with tuberculosis, desires, nevertheless, to call the attention of the medical profession to the evident danger to the public health necessarily involved in such travel, when the individual is ignorant of proper methods of personal hygiene, or wilfully negligent of the same.

1. That physicians discourage, as far as possible, travel in public conveyances by those afflicted with tuberculosis, and that when such travel is absolutely necessary, the patient be properly instructed as to methods of prophylaxis.
2. That the association use its influence looking to the enactment of State laws requiring the disinfection, at the company's expense, of all conveyances occupied by tubercular patients, before such conveyances are again used by the traveling public, and that pending the enactment of such laws, all local health officers be advised to secure such disinfection.

NEW YORK MILK MUST BE PASTEURIZED.* "After three years' study of the milk problem and practical experience in feeding babies, the New York Milk Committee, on December 5, promulgated a formal statement in favor of pasteurization as the method of securing safety from tuberculosis and other milk-borne diseases. The declaration of the committee was in the following terms:

*Florida Health Notes, January, 1909.

"During the past three years the attitude of the New York Milk Committee toward the use of pasteurized milk has been so frequently misquoted that we ask your attention to the following authoritative statement of its opinion and practices:

"The committee approves of the pasteurization of all milk which has not been produced under sanitary conditions, which has not come from tuberculin-tested cattle and cattle otherwise free from disease, and which cannot be supplied to the consumer with a sufficiently low bacterial content to offer safety from milk-borne infection.

"The committee approves of the pasteurization of milk when modified for infants' use in the home.

"The committee approves of all measures, individual, State or municipal, which will lead to the institution of sanitary conditions on dairy farms. The conviction has on two occasions led it to oppose measures directed toward the establishment of compulsory pasteurization of milk by the city or State authorities, on the ground that such measures would put the producers of dirty milk on an equal footing with the producers of clean milk, and thereby postpone the institution of the desired sanitary reforms."

At the last meeting of the board of aldermen an ordinance was introduced for the better regulation of the milk traffic. This measure, if adopted, will prevent the sale in this city of milk and cream not pasteurized that comes from dairies where herds are not certified by the board of health to be free from tubercular disease. The certificates would have to be renewed monthly. The first two sections of the ordinance read as follows:

"SECTION 1. On and after Jan. 1, 1909, no milk nor cream shall be sold at retail, or offered for sale at retail, in the city of New York, except as hereinafter provided, unless the milk or cream has been certified by the Department of Health as containing not more than 500,000 bacteria to the cubic centimeter.

"SECTION 2. All milk and cream not from certified herds, or not conforming to the said bacterial standard, shall be pasteurized by exposure for at least twenty minutes to a temperature of 167° Fahren-

heit, or by exposure for at least thirty minutes to a temperature of 158° Fahrenheit, under the supervision of the Department of Health, and sealed with a label showing said process, as hereinafter provided."

THE SECRETARY OF THE MASSACHUSETTS STATE BOARD OF HEALTH.* "Dr. Mark W. Richardson has been appointed Secretary of the Massachusetts State Board of Health in the place of the late lamented Dr. Charles Harrington, whose position since his sudden death on Sept. 11, 1908, has been unfilled. Dr. Richardson was graduated from Harvard College in 1889, and thereafter spent a year in foreign travel. He then entered the Harvard Medical School and received the degree of doctor of medicine in 1894. After serving as a medical house pupil at the Massachusetts General Hospital, he again went to Europe for a period of fifteen months, devoting himself to the study of general clinical medicine and pathology in Vienna, Dresden and Berlin. On his return to America he entered upon the practice of medicine, although his natural bent, even at that time, was rather toward laboratory investigation than the details of practice. He received the appointment of assistant in pathology at the Harvard Medical School in 1898, and in 1900 was appointed an assistant in the theory and practice of physic at the same institution.

"He is a member of the Association of American Physicians, to which he contributed a valuable statistical paper on treatment by the newer methods at its last meeting. He also holds membership in the American Association of Pathologists and Bacteriologists, the Boston Society of the Medical Sciences and the Massachusetts Medical Society. He has, at various times, held the Dalton scholarship at the Massachusetts General Hospital and the Bullard fellowship.

From the foregoing statement of Dr. Richardson's activities up to the present time it is not to be questioned that he has an exceptional training for the responsible position which

* Boston Medical and Surgical Journal, Jan. 14, 1909.

he is now called upon to assume. His work in bacteriology in relation to the theoretical problems of disease and his laboratory training in general *fit him peculiarly* for meeting the problems which *State health legislation* is now facing, and is likely to face, in increasing degree, in the years to come. It is also not to be doubted that his general interest in and knowledge of medicine in its more practical aspects, will be a valuable asset in the work before him. It is increasingly evident that the medical profession is coming to occupy a closer and closer relation to public affairs, and this must be particularly the case in the relation of State boards of health to the fundamental problems of sanitation and prophylactic medicine. The opportunity, therefore, which this position offers may hardly be overestimated, and it may be permitted us to say, especially in this State, which has long been a pioneer in matters of progressive health legislation. Dr. Richardson's predecessor, Dr. Charles Harrington, was a man of peculiar force and industry, and brought much credit to the position which he filled. We have reason to believe that Dr. Richardson will prove a worthy successor."

ANTI-VACCINATION LAWS IN UTAH. It has been repeatedly proven that a scourge of smallpox will, sooner or later, visit any considerable population unprotected by vaccination. It is strange, indeed, in this enlightened age, and in these United States, to see the population of a whole State submitting to a law which deprives them of the protection against this terrible disease which should be theirs. Truly, "experience is a hard school, but some there are who will learn in no other."

Dr. Beatty, Secretary of the Utah State Board of Health, in a supplement to the November, 1908, Bulletin issues the following warning to the people of the State which they will be wise to accept:

"Utah enjoys the unique distinction of having a larger proportion of inhabitants who are unvaccinated, and who

are opposed to vaccination, than any other civilized State or country. It is, therefore, practically unprotected from the invasion of smallpox, which has prevailed more or less extensively every year for the past nine years, and will continue to menace life and health, and burden the taxpayer until the irrational prejudice shall be overcome. The cause of this unusual situation was the fanatical crusade of the so-called 'anti-vaccinationists' at the time of the first outbreak in the State. Had it not been for the unfortunate influence which for many months they exerted in every way calculated to create prejudice against a harmless and beneficent measure, there is no reason to doubt that Utah would long since have been protected from the disease in the same degree as in other States.

"An additional handicap resulting from the anti-vaccination clamor is a law passed at the time which specifically removes from the health authorities, or others, the power to exclude unvaccinated children from school, or under any circumstances to enforce vaccination. This law is also unique, existing in no other State. On the contrary, most States require all school children to be vaccinated, and empower boards of health to enforce vaccination when it is deemed necessary for the protection of public health.

"The State at this time is threatened with a general outbreak of smallpox. It is extensively and increasingly prevalent in Salt Lake, and will, most certainly, be communicated to surrounding localities. The only means of prevention is *Vaccination*. This, if recent, will surely and without injury prevent the disease. To insure protection revaccination should be performed after five years. The many stories of serious results from vaccination are almost invariably untrue, and should not be accepted without proof. They are usually based on hearsay and circulated by those who oppose vaccination.

'People are urged to consider the subject with unbiased minds, and there can be no question as to their conclusions.

They owe this as a duty to themselves, their children and the State.

"Health officers and physicians are called upon to earnestly interest themselves in a campaign of instruction in order that the truth as to vaccination may be as widely circulated as were the former misstatements."

ANTI-TUBERCULOSIS CRUSADE IN THE PUBLIC SCHOOLS.* "The Richmond Health Department has just issued a booklet on "Tuberculosis, its Causes, Prevention and Treatment," for use in the upper and middle grades of the public schools of Richmond. A little less than a month ago the Board of Health inquired from the School Board, whether they would consent to have this subject taught, provided the Health Department would furnish the pamphlet. The School Board showed the same active interest in this matter that they always evince in public health subjects, and at once consented. The pamphlet is one of twelve pages of text (in eleven point type), with two illustrations. It is written in very simple language. A copy will be given to each pupil in the grades in which it is used.

"Besides being used in the public schools, the principals of every private school in the city will be invited to have it taught in their schools, for which purpose the Health Department will furnish any desired number of copies.

"It is believed that this is one of the most important steps yet taken by the Health Department. As stated in the pamphlet itself: 'Every one of these deaths (from consumption) was caused by the ignorance or the carelessness of some one. When everybody understands just how tuberculosis is caused and how it can be prevented, and when everybody puts these lessons into practice, there will be no more tuberculosis;' but the task of teaching the majority of adults is hopeless. By having the subject taught in our schools, in a few years a considerable proportion of our citizens will

* Monthly Bulletin of the Health Department of Richmond, Va., December, 1908.

be thoroughly informed on the main points of prevention, and the results will be invaluable.

"Before beginning to use the present pamphlet in the schools a meeting of the teachers will be held, at which the subject will be gone over thoroughly and an illustrated talk given them, besides which the best methods of really instructing the children on the subject will be discussed. Not only will the children themselves be instructed, but a copy of this pamphlet, in simple language, going into so large a proportion of the homes of Richmond, a considerable number of adults will be taught as well. Any citizen of Richmond who has no child in the public schools and who wishes to have a copy will receive one on application."

THE CALIFORNIA STATE HYGIENIC LABORATORY,* Dr. A. R. Ward, Director, has just removed to its new quarters in the hygiene and pathology building, which the State University has just finished.

The space alloted to the laboratory is sufficient to provide for a staff of four or five assistants, ample provision having been made for incubator and special research room. An animal house will be constructed convenient to the laboratory, where mice, guinea pigs, rabbits and dogs can be kept for experimental purposes.

Provision has been made for the expansion of the work of the laboratory for several years, and it will be possible for the laboratory to undertake problems limited only by the appropriations allotted the Department.

THE NORTH CAROLINA STATE ASSOCIATION FOR THE PREVENTION OF TUBERCULOSIS† held a most helpful and successful meeting in Charlotte, N.C., Jan. 12, 13, 1909. There were thirty-eight papers on the program, most of which were read.

* Bulletin California State Board of Health, December, 1908.
† Bulletin North Carolina State Board of Health, January, 1909.

Through the courtesy of Dr. Register of the *Charlotte Medical Journal*, the entire proceedings will be printed in a special edition of that periodical.

A KANSAS STATE ASSOCIATION FOR THE STUDY AND PREVENTION OF TUBERCULOSIS was organized Dec. 3, 1908, at a meeting called by Governor Hoch in Topeka.

THE NORTH DAKOTA STATE BOARD OF HEALTH BULLETIN, in its new and enlarged form, is a welcome addition to public health literature. The good accomplished by these educational bulletins cannot be overestimated.

Volume I, No. 1, November, 1908, takes up the crusade against tuberculosis. No. 2, January, 1909, is principally devoted to school hygiene.

Concerning North Dakota, we are pleased to make the following quotation from an editorial by Dr. Grassick in the latest bulletin:

"North Dakota has now reached that stage in its development when it must take its place alongside of the older States in every thing that pertains to its material progress. It is no longer on the western border of civilization, but right in the center of the most enlightened section of our country. Its soil has been so productive that it has earned the title of "the breadbasket of the world." Its institutions of learning are turning out scholars that are winning laurels when pitted against the graduates of eastern schools. Our citizenship is of as high a grade, morally, intellectually and physically as that of any State in the Union; and it only remains for us to fill in some of the gaps to make us a model of Statehood."

BOOK REVIEWS

The Systematic Relationships of the Coccaceae with a Discussion of the Principles of Bacterial Classification. By CHARLES-EDWARD AMORY WINSLOW AND ANNE ROGERS WINSLOW. *New York, John Wiley & Sons*, 1908.

In spite of the attempts of the Committee on Standard Methods of the American Public Health Association to secure uniformity in all our bacteriological procedures, and in spite of the chart proposed by the Society of American Bacteriologists for the uniform description of bacterial species, the bacteria continue to vary, and we have been unable, therefore, to arrive at a scheme of classification which shall be anything more than an artificial grouping for convenience in identification.

But with the publication of this book of the Winslows we see the dawn of a new era in bacteriological classification, and we have hope that soon we may see a scheme of classification worked out which shall be something more than a plan to enable us to determine whether a species has been described in the literature, one which shall express the real relationships of the different forms and tell us something of the paths along which bacterial evolution has taken place.

All the earlier schemes of classification have been artificial and arbitrary. They have not expressed natural relationships. The few groups which have been based on morphological characteristics, such as the cocci, the bacilli, and the spirilla, may represent natural families or genera; but in the further subdivision of these groups, where the criteria of classification are physiological characters, all

semblance to a natural classification is lost and we find only bewildering confusion.

This is but natural when we consider how variable and uncertain most physiological characters are. Further, we have no precedent for making use of physiological characters for classification, even among the higher plants and animals. We can never hope, however, to get a satisfactory classification of the bacteria based on morphological characters alone. Organisms which resemble one another so closely morphologically, while so widely different physiologically, must, of necessity, be classified by their physiological characters. At first classification based on physiological characters seems hopeless, particularly if our classification is to be a natural one and express real relationships between the forms placed together, as every real classification should. That such a classification is not out of our reach, however, is made evident by the work before us. The principle which the authors of this book bring to our attention is by far the most important contribution to the purely-scientific side of bacteriology which has appeared in a long time.

Their method of defining bacterial groups is by the study of the numerical frequency of different characters in a large series of cultures. This is not a new method. It has been used for some time by anthropologists and students of variation and heredity. Indeed, while the work of the Winslows was going on, there appeared a paper by the English workers, Andrewes and Horder, on the classification of the streptococci, which they had worked out by this method. But, whether old or new, it is to the credit of the authors of the present volume that they have appreciated its value, and have applied it on a large scale to the whole problem of bacterial classification.

This method of biometry depends on the fact that fluctuating variations, when measured in a considerable number of individuals, group themselves in a curve, which follows the simple mathematical laws of chance. These curves

are identical for any group of individuals of the same origin. But if they are from different origins the shape of the curves will differ as well as the position and height of their modes. While particular members of two groups may be indistinguishable, the two groups will be sharply differentiated by the characters of their curves. Further than this the statistical method will serve to indicate the relationship of the different groups if the observations are extended to the correlation of different characters.

To quote the authors' own words: "The biometric methods, which have proved so useful in the study of the races of man, promise to be of even greater value in the systematic analysis of types among bacteria, where so many factors combine to preserve varietal differences on so wide a scale. If individual strains only are considered an infinite series of differences appear. If the same strains are considered statistically, that is, if the frequency of a given character be taken into account, it is apparent that certain combinations of characters are more common than others. Measurement of almost any character by quantitative methods shows that the bacteria examined group themselves on a simple or complex curve of frequency. The modes of this curve indicate centers of variation about which the individuals fluctuate; and these centers of variation are the real systematic units of the group. The recognition of such centers, as specific types, offers the natural and satisfactory compromise between systematic multiplicity and vague generalization. The grouping of specific types is an even more important problem than the definition of the types themselves; and here the correlation data obtained by biometric study are of assistance. A true, natural classification is tree-like, and includes branches and twigs of varying grades of importance. Genera of bacteria should be aggregates of those specific types which are most nearly related; and the basis of the relationship will differ in each individual case. . . . Finally the results may be analyzed with two ends in view. First, each center of numerical

frequency, marking a group of organisms varying about a distinct type in regard to a single definite property, may be recognized as a species. Second, those species which are bound together by the possession of a number of similar properties may be constituted as genera, and larger groups of genera, still characterized by some characters in common, may receive the rank of families or subfamilies."

We have no doubt that the application of this principle to bacterial classification will give us a sound foundation upon which to build our systematic groups. It will give us a natural system of classification which will indicate to us the probable relationships of the different groups. It is true we shall have to revise our nomenclature but, on the whole, this will be of advantage. The present method of having large and unwieldy genera has made it frequently necessary to use trinomial and quadrinomial names to distinguish species. If we can abandon such enormous genera as micrococcus and bacillus, and make use of definite smaller groups of generic value, even though these are based on physiological characters, it will certainly be an advantage.

As a practical illustration of how to apply this principle to classification the authors have given us a most complete and careful study of the natural groups of the Coccaceae. They have submitted some 500 strains of cocci from different sources to a series of definite tests, have plotted the frequency curves for these characters, studied the correlation of these characters, and have taken the modes of the frequency curves as the bases for the establishment of the different groups.

The characters which they selected for this study were as follows: 1, Habitat; 2, Grouping of cells and dimensions; 3, Relation to Gram's stain; 4, Vigor of surface growth on agar streak after fourteen days at 20°; 5, Amount of acid produced in two per cent dextrose broth after fourteen days at 20°; 6, Amount of acid produced in two per cent lactose broth under the same conditions as under 5; 7, Formation of

nitrates in nitrate solution; 8, Formation of free ammonia in nitrate solution; 9, Comparative growth and color production after fourteen days on agar streak at 20° and 37°, respectively; 10, Chromogenesis; 11, Depth in cm. of gelatin liquefaction in tube of 10 mm. diameter after thirty days at 20°.

We may at first be somewhat surprised at the particular characters chosen, but in every case the evidence upon which the choice is based is given, and we can but agree with the authors that the eleven tests chosen are sufficient to enable them to recognize the most important natural groups.

A further study of the correlation of these eleven characteristics shows that the groups selected are marked by a general association of a number of independent characters, and this fact can only be explained, our authors say, by the natural relationship of the groups.

The groups marked out by the authors are as follows: Family, Coccaceae; Subfamily, Paracoccaceae; Genera, Diplococcus, Ascococcus, Streptococcus, Aurococcus, Albococcus, Subfamily, Metacoccaceae; Genera, Micrococcus, Sarcina. Rhodococcus. This gives us eight genera among the Coccaceae, each of which, undoubtedly, represents a natural group, and the arrangement of these groups in the subfamilies gives us an insight into their natural relationship and probable line of descent.

In looking over this arrangement we are struck by several entirely new ideas. First we notice the great importance placed upon pigment production. We have been led to think in the past that this character is an exceedingly variable one and of little systematic importance. But a study of chromogenesis by the biometric method shows that the production of the various pigments is the property of certain well-defined types, that it is correlated with many other physiological characters, and that it therefore must be of genetic significance. Again we find the authors laying little stress on the shape and markings of colonies on agar or gelatin, or the shape of the liquefaction in the gelatin stab, all of them

characters to which previous systematists have given considerable weight. Our authors point out that these characters are but the result of differences in the vigor of growth, the solidity of the gelatin, the presence or absence of moisture, etc.; but they are careful to state, however, that in other groups these same characters may be of greater value.

After the general discussion of the principles of bacterial classification and the presentation of the results of their study of the Coccaceae, the authors give us a summary of the genera and species of the Coccaceae in a form for easy reference, and then a well-arranged key to these genera and species, and finally a complete bibliography and author and subject index.

We have in this fine piece of work then, two very valuable contributions to the science of bacteriology for which to thank our authors. First, the suggestion of a new principle by which we may derive a natural classification of the bacteria, even though we must use the exceedingly variable physiological characters, and second, a very valuable illustration of the application of this principle to the classification of the Coccaceae. We can but praise the thorough way in which the work has been carried out and the admirable clear and comprehensive way in which it has been presented to us. We hope that the excellent example set by these authors will be followed by workers in other lines, and that we shall see the biometric method mapping out for us the real relationships of the other groups of bacteria. A long series of monographs of other groups worked out on the lines suggested in this book will be the greatest compliment which bacteriologists can pay to the work of these authors.

F. P. GORHAM.

Chemical and Biological Survey of the Waters of Illinois. By EDWARD BARTOW, Director. *Report from Sept.* 1, 1906, *to Dec.* 31, 1907.

This bulletin contains a report of the work of the Illinois

Water Survey from its inception to Dec. 31, 1907, together with a number of papers prepared by members of the staff of the survey, and concerning problems incidental to its routine work.

The main report consists of a description of the work accomplished during the sixteen months ending Dec. 31, 1907.

The report divides the waters of Illinois into three general classes, viz., rain waters, surface waters and ground waters. These are again subdivided according as the water comes from streams, lakes, ponds, or from springs, shallow or deep wells, and wells in rock or drift. Tables show the number of waters of each class examined in each month during 1906 and 1907.

Analyses of shallow wells predominate, while those of surface waters are next in number. Deep drift and deep rock wells have been examined in almost equal number, and samples from springs form the next largest group of analyses.

Sixty per cent of all waters received were condemned, the deep wells being by far the most acceptable sources of supply, for only thirteen (13) per cent of the waters from this source were open to suspicion.

The results of an investigation of manufacturing wastes, which comprised gas, sugar house and acid iron wastes, contains much statistical matter and many instructive tables.

The following methods of disposal were considered: 1, Dilution; 2, Clarification in Sedimentation tanks followed by filtration; 3, Evaporation; 4, Chemical treatment. Methods 1, 3 and 4 were carried out on the final waste product from the Corn Refining Company's plant.

The report contains a very valuable and interesting chapter on "Interpretation of Results," which throws additional light on the meaning of the ordinary sanitary analysis of western waters, and also suggests limits of impurities.

There is a report, also, of an investigation of the waters of Normal, Ill.

Three papers are reprinted, viz., "Sanitary Chemical Examination of Water Bacteria," by A. W. Sellards, *Journal of Infectious Diseases*, 1907, supplement No. 3, pp. 41–49. "Laboratory Experiments in Water Treatment," by Edward Bartow and J. M. Lindgren, *Journal American Chemical Society*, volume XXIV, page 1,293. "Normal Waters of Illinois," read before Laboratory Section of the American Public Health Association at Atlantic City, Sept. 30, 1907.

The report contains much valuable data, and will be of interest to all connected with sanitary work.

C. F. LONG.

The Electrical Conductivity of Natural Waters with Special Reference to its Practical Application in Water Analysis. By DR. H. STOOFF. *Gesundheits ingenieur, January*, 1909.

The author proposes a determination of electrical conductivity as a method for determining the potability of water, especially as regards contamination by organic matter and mineral salts. He states that the electrical conductivity method has been extensively used in Germany in studying waterworks problems, especially where it is a question of supplies from both surface and ground sources.

The main features of the theory of electrical conductivity in dilute solution are first set forth, followed by a discussion of the application of theory to practice. Most of the salts present in natural waters are highly dissociated. Carbonic acid is not, but its salts are strong electrolytes.

Conductivity measurements are effected in the usual manner, with due regard to temperature. Ordinarily a correction for temperature must be applied.

The electrical conductivity of natural waters varies between 6.10^{-4}. and 6.10^{-3}. Chemically pure water shows a conductivity of $0.04.10^{-6}$.

A conductivity determination is available for determining

the approximate quantity of mineral salts, since there is a fairly constant relation between the mass of the combined electrolytes and the conductivity. The author develops the necessary factor.

This method is very rapid, is especially available for detecting changes in the composition of water, whether pollution by surface water, by sewage or by harder ground waters. The method is readily adapted to field uses. A portable outfit is described. Experiences at the Royal Prussian Testing Institute at Berlin have shown that the method is exceedingly useful as a rapid means for determining the quality of water. It is not intended to replace chemical and bacterial tests, but rather to supplement the information usually so secured by indicating directly any abnormal features of a given water.

A. ELLIOTT KIMBERLY.

A Text-Book of General Bacteriology. By EDWIN O. JORDAN, PH.D. *W. B. Saunders Company, Philadelphia*, 1908. Price $3.00.

The author of this work has produced a general bacteriology worthy of more than passing comment. He has succeeded particularly well in a most difficult task, namely, the production of a book which, while sufficiently elemental for the beginner, is nevertheless very readable and instructive to the advanced student, and at the same time of some value as a reference work.

As is, perhaps, to be expected from the relative importance, the last three-quarters of the book is devoted to pathogenic organisms; the first quarter being devoted to a lucid explanation of bacterial methods, the effect of physical and chemical agents, bacterial products and the classification of bacteria.

About forty pages are devoted exclusively to a discussion of immunity handled in a manner which is calculated to give the beginner a fair insight into a somewhat abstruse subject.

Following immunity are chapters on the various pathogenic organisms logically grouped, and finally chapters bearing on the bacteriology of milk, air, water, soil, etc.; one chapter on industrial bacteriology, one on the disease of plants, and finally an appendix dealing with the infectious diseases of unknown causation.

Practically all of the latest advances in the science are discussed at length, both sides of mooted questions given a fair bearing, but usually with no attempt on the part of the author to settle the controversy. As a rule conclusions are logical and not overdrawn.

It is with a feeling of relief that one notices the absence of the time-honored illustrations which have been copied from one bacteriology into another. One familiar cut still confronts us, — that of the nearly obsolete vertical autoclave, with its multiple clamps. The illustrations are as a rule good, though one is inclined to wonder occasionally how much help the average reproductions of photomicrographs are to the student. Especially does this come to mind when *Bacillus mallei* has all the earmarks of *B. diphtheriæ* (p. 363). Nor is it of any special advantage to show a culture of *B. diphtheriæ* twice (pp. 228, 229).

Taken as a whole there is but little to criticise. On some points differences of opinion might arise as to the advisability of certain procedures. For example, while cover glass preparations (page 44) are exceedingly valuable to the student, they are a source of annoyance and loss of time to the routine worker and serve no very good purpose, since a slide smear will answer as well.

In staining the tubercle bacillus (page 46) one is advised to boil the stain over a free flame thirty seconds. In the hands of others this technique often results in raising the smear in places from the glass; gentle heating serves the purpose of fixing the stain and does no damage. On page 47 we are told that flagella are easily broken off, despite Hill's experiments (*Journal of Medical Research*, new series, Vol. VIII., page 97),

in shaking bacilli for many minutes vigorously without harm to the flagella.

On page 63 the following statement occurs: "A noteworthy correlation of characters is shown in the almost unfailing association of spore formation with a strictly anaerobic habit of life." Since the sentence following this refers to the single spore bearing aerobe pathogenic to man (anthrax) it is probable that the sentence quoted was written with pathogens alone in mind, but the statement as it now stands is open to serious question.

The editorial training of the author is shown in the almost total lack of typographical errors, but one—a double dagger, p. 168, for an asterisk,—being noticed in reviewing. In public health work, including diagnostic bacteriology, the author shows an excellent grasp of the subject, his statements being clear and conservative. Could one statement regarding typhoid fever be impressed on the inhabitants of those cities who feel that it is better to drink dilute sewage and pay occasional undertakers' fees than it is to put money into filtration plants, much good might result: "The number of deaths reported indicates that there are, at least, 350,000 cases of typhoid fever in a single year in a population of about 76,000,000, and that in the course of a decade, perhaps, one person in every twenty or twenty-five contracts typhoid fever. *These cases are caused by taking into the mouth germs dis charged in human urine and feces, and the conditions that make this possible do not imply that a very advanced state of civilization has been reached.*" (Page 267, italics ours.)

In the chapter on glanders (page 367) the statement is made that the guinea pig reaction is not absolutely specific, since analogous orchitis may be occasioned by other organisms, and the impression is given that the reaction is one to fall back on when other tests fail. This would, indeed, be true were one to trust to the lesions without cultures therefrom. In the hands of the experienced worker a mistake is an impossibility if guinea pig *and* culture are absolutely typical. Some

statement should have been made that *B. pyocyaneus* gives a somewhat similar, but easily distinguishable growth on potato, and may produce a somewhat similar but less complete orchitis in the pig.

In the chapter on milk no reference is made to the excellent work of J. O. Jordan in tracing out diseased cows from the results of streptococci and pus examinations in milk, although the value of such examinations is discussed and other results mentioned.

The criticisms above made should in no way give the impression that the book is other than of the highest class, written by a man who knows his subject, and knows how to present it.

B. R. RICKARDS.

PAMPHLETS RECEIVED

Bacterial Associations in the Souring of Milk. C. E. MARSHALL and BELL FARRAND, *Michigan State Agricultural Experiment Station.*

Keeping Qualities of Butter. W. S. SAYER, O. RAHN, B. FARRAND, *Michigan State Agriculture Experiment Station.*

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WANTED. Position by a chemist, B.S. Have a thorough knowledge of bacteriology, experienced in hygienic work, including work on water and sewage. Can furnish the best of references. Address "Sewage," care AMERICAN JOURNAL OF PUBLIC HYGIENE.

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WANTED. Bacteriologist and chemist in the laboratory of a State Board of Health of the middle west. One with training in bacterial diagnosis, water bacteriology and the chemical analysis of water and sewage. In applying state age, references, previous experience, and salary expected Address X, care AMERICAN JOURNAL OF PUBLIC HYGIENE.